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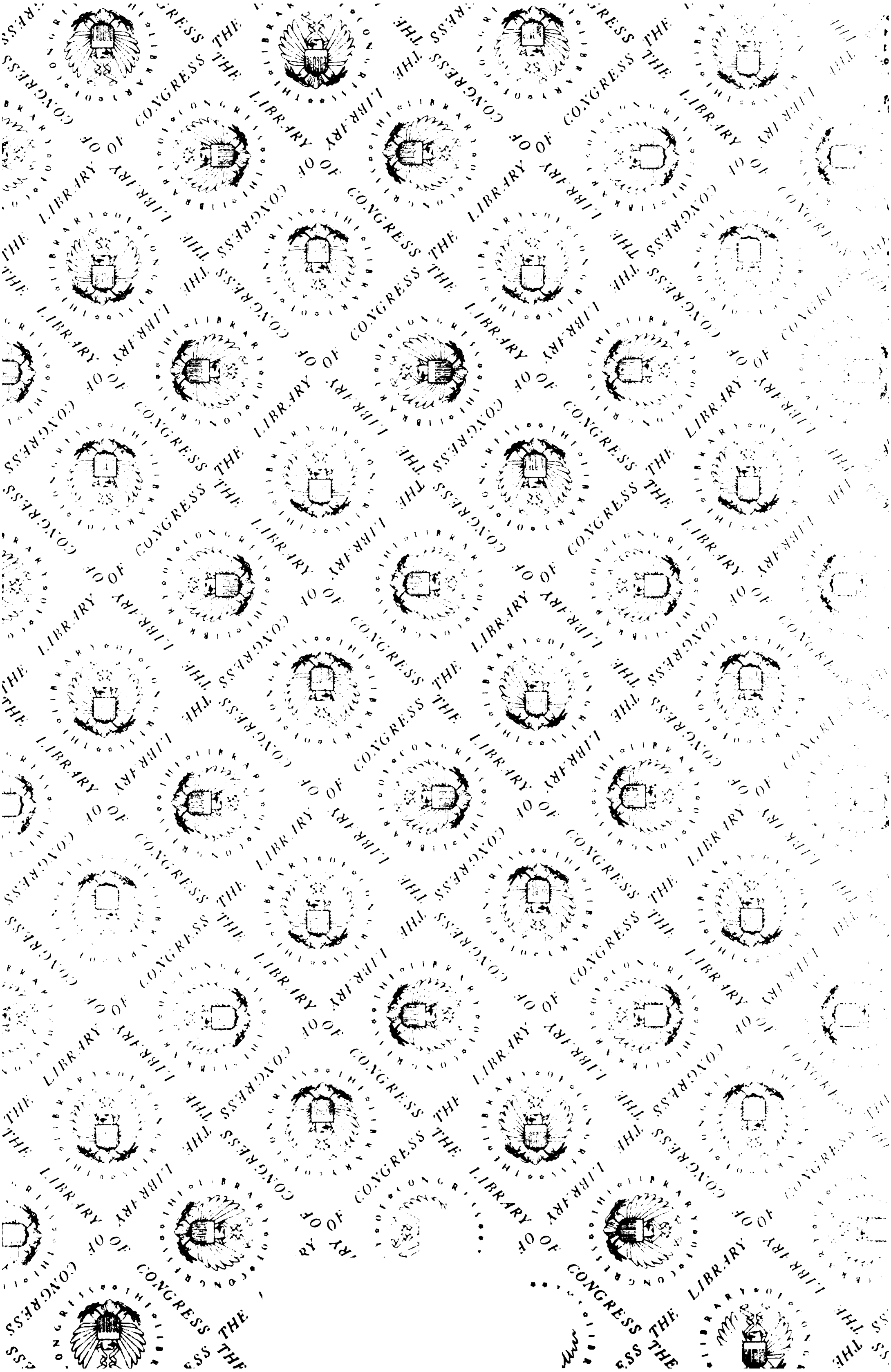
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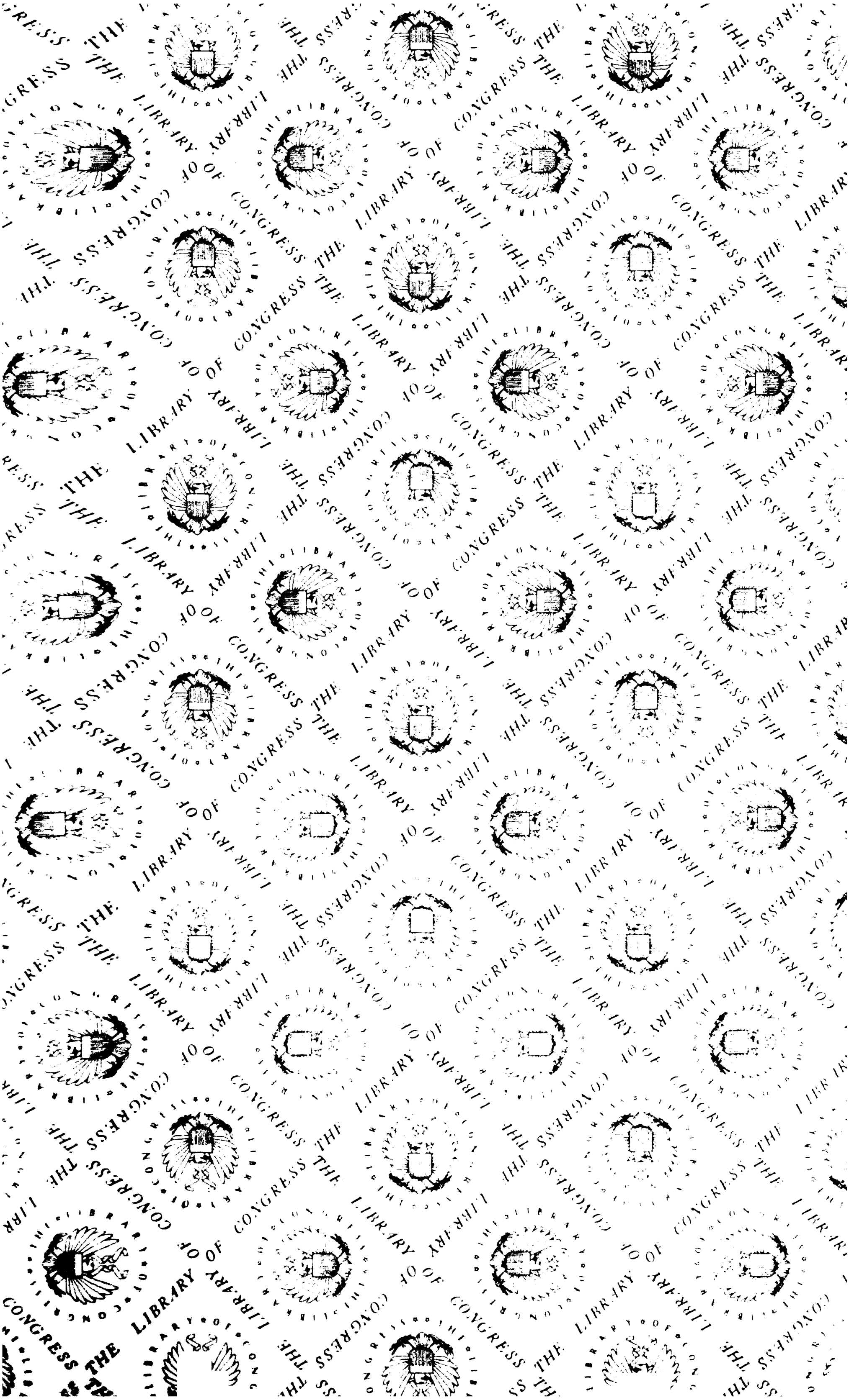
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THE

COUNTRY GENTLEMAN'S MAGAZINE

14

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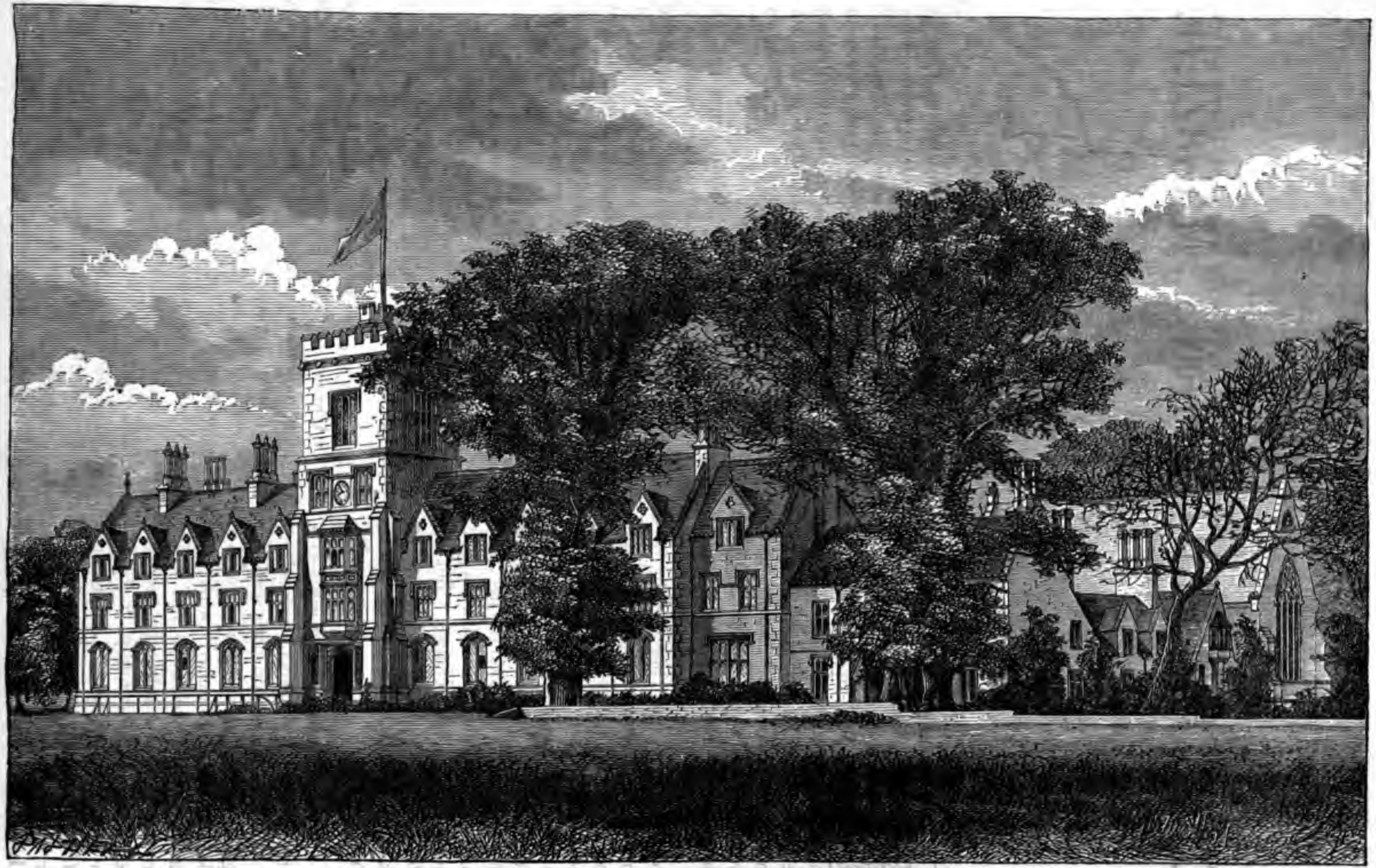

THE ROYAL AGRICULTURAL COLLEGE, CIRENCESTER.

THE

UNTRY GENTLEMAN'S MAGAZINE

JANUARY 1869

THE SCHOOL OF CERES.

IT is matter of regret with me that, in early life, I was never introduced to the lady whose *carte* (not "cart") appears on the opening this journal. Her amiable face never l on me; to my youth her sweet lips ed no words of instruction; and the arched by that noble brown (an eye diant with meaning, not blind, as alas! w) was neither my guide nor warning. d have loved her waving tresses and a fillet better than the tight-drawn hair ided knot of the rigid dame that taught : hard dull commerce in the city. I have liked her choice of "artificials," ng her with yellow corn, and the taste l her (as in framing her portrait) to d herself with a *cordon*, keeping prickly d thistles at defiance. But in my case *nater* was not rural; and I never l to handle those manifold tools for farm rden—

> "A spade, a rake, a hoe,
> A flail, or what ye will"—

he seems to affect so closely. I never forth bearing precious seed," or "came ejoicing, bringing my sheaves with me," ose round-limbed twins of hers who ade themselves *so* hot with reaping. : I cannot subscribe myself, like this cal, as definitely "*The Farmer*," indefinitely as "a farmer;" and am hat I may be considered an "indefinite ' without any profession subjoined. er, I am blest with an eye as well as a taste for the agricultural; and it so happens that I lately became acquainted with what was to me "a new and striking fact." Our charming Ceres in her old days keeps a school, and though in her picture sightless, has really many pupils in her eye: in short, I have enjoyed the pleasure of being "shewn over her establishment."

It was on this wise: While Jonathan Oldbuck and I were out on an antiquarian excursion (you know Jonathan, and his house lumbered with his old oak, his leather-backed books, brass-bound clocks, broken-legged bronzes, rusty armour, and tea-cups of Spode and Wedgwood, and other quaint crockery on which the cracks make the pattern—

> "He has a routh o' auld nick-nackets,
> Rusty airn caps, and jinglin'-jackets,
> Would held the Loudons three in tackets
> A towmond gude;
> And parritch-pats, and auld saut-backets,
> Afore the flude"—

chance led as to Old Corinium, on the river Churn or Quern—whence comes the other name of Cirn-cester, or Cirencester—in the county of Gloucester, and within the precincts of the broad vale of King Alfred's White Horse. And having satiated our curiosity with Roman pavements and other interesting remains, and gratified our taste with the rich Gothic architecture ornamenting the pretty old-fashioned town, we pedestriadized northward for a bit of engineering, in the shape of Brindley's canal, bored through the country in the pipe-cavern of Sapperton tunnel. You walk through Earl Bathurst's park, I believe the most extensive in England—miles upon miles of green glades and airy avenues, of thick woods and furzy dingles, of shaven pasture with its fallow deer, and lovely clumps of elm and beech. Here you look up at an antient weather-battered column, with its statue on the top, proclaiming to wayfarers that "Queen Anne is dead;" there you walk under a spreading chestnut, and find it (as we did) to be 30 yards in diameter; further on, along a broad "drive" (not of gravel, but grass) between lofty drooping-branched trees that form miles of dense green wall, you come to an open space from which radiate seven avenues, with church spires or other picturesque objects of the distance revealed at the end of each vista. You find a rustic arbour, "Pope's Seat," and you sit where the poet sat, listen to the woodland voices and woodland echoes, and suppose you are thinking as the poet thought; you turn aside to light upon all sorts of romantic episodes in the forest recesses, amid trees of every leaf, haunted by songsters of every wing. Chief among these surprises is the solemn gloom of the "cathedral firs"—a pile of black spruces soaring straight and sombre to a vast height, and so planted as to form a mighty nave and transept, fitly shadowed with "dim religious light." It was on our return that we fell in with an unexpected adventure—not alone a pleasant crossing of our path by "bold reynard," with musical pack and pink pursuers after his brush, but an incident which led to our sight of "the School of Ceres." Arrived at the "ten drives"—a sort of arboretal "seven dials" on an enlarged scale—a grassy plot, from which strike off in different directions ten rides, cut straight through the thick groves, over undulating or level ground, till they lose themselves in dim distance—loud and merry voices struck upon our ears; and suddenly we came upon a group of railway surveyors (they appeared to be), busy with poles, flags, and a photographic-looking three-legged instrument of brass that sparkled in the sunlight. They turned out to be a party of gentlemen that had "found their level"—no, brought their theodolite with them—and were learning to manipulate the milled-headed screws with that delicate touch requisite for such fine operations as adjusting the little telescope to fractions of degrees, poising it according to the air-bubble in the spirit level, and fixing the angle of direction of a distant village tower. They were students from the establishment I have named; and this—while presided over, I suppose, by the goddess of brown tillages and aromatic harvests—stands also under the patronage of a lower than Parnassian throne, being dignified with the title of "The Royal Agricultural College." The instructor of this "field-surveying class" was the Principal of the college; and, responding to his courtesy, we now resolved to see for ourselves what a rustic *alma mater* could be like. As we walked along, we got into conversation with one and another of this class, and were much struck to find officers of the army, navy, and Indian services, devoting their furlough to the acquirement of such knowledge. One of them, who had been many years in India, and was then resident with his wife and family at Cirencester, told me how pleased he was to have found a spot where he could refresh his body and store his mind at the same time; adding that he expected to take back to India that which would prove of great pecuniary value. He had known a time when a very slight knowledge of figures and surveying had added to an officer's annual income £700.

Was this *alma mater* a big farm-house, all gables, half-hidden in a garden all apple-trees? Did "the men" wear gowns (except when surveying), or did they look ruddy and healthful in smock-frocks? Did they breakfast at five o'clock on bread and milk helped with wooden spoons, and on bacon three inches in transverse sections? Did they develope egg-like biceps with the heavy swing of the muck-fork? Did they plough, and "jocund drive their teams a-field?" Did they mix and administer pig-feed? Did they milk? Did they reap? Did they hoe? Evidently these men in the surveying class were "gentlemen, apparently active, and with "inquiring minds," likely to try their hands at all sorts of operations in husbandry, though not

et to mechanical drudgery that is con-
to perspiration, but not to the brighten-
nental perceptions. We all struck across
rk for the College, picking up in our
large "field botany class" returning
ts scientific spoils.

found a fine collegiate building (of
I received a tinted "view"), with its
et tower and its Gothic chapel, much
turreted Elizabethan-windowed college,
ated from Oxford or Cambridge. We
cted the neat airy dormitories and hand-
private apartments for students, the
row of studies, heated (like all the inte-
by hot-water pipes; the library, reading-
, and large dining-hall. Here we enjoyed
l-day dinner (with the Principal and Pro-
rs and senior students at a cross table)
e university style. In this room are con-
d the weekly examinations; and on a
lack board at one end still remained un-
rated chalk diagrams of the teacher of
ing, apparently illustrative of cottage
ing. Here you have your breakfast at
gular hour, after the short prayers in the
l; your dinner (for which the bell tolls
precision to a minute); your tea at six
k; and then your final meal before bed-
—just in college style—"good grub," and
u like) extras of various kinds set down
u. We heard all about the cricket club
play capital matches on the lawn front-
e College, and can boast of several good
the choral classes, the debating club,
ccasional bits of hunting or aquatics, and
seemed more like business) the plough-
atch, which is celebrated every autumn.
museum is well furnished with every-
requisite in the way of geological, che-
, botanical, and veterinarian specimens
odels. Indeed, some of the best sources
ormation are displayed here; such as
undant samples of grains and seeds of
rts, from a mixture of which the students
ick out all the several grasses, weeds,
n a manner surprising to the uninitiated.
power of distinguishing agricultural
and weeds by the seeds must be in-
ble to a farmer in the seed market; the
ced classes are *au fait* at it, and I doubt
whether one in a hundred of existing agriculturists would be able to do the like. Again, the casts of the mouths of animals, exhibiting the exact appearances of their dentition at different ages, form a grand preparatory study before investigating the mouths of living animals, which are never to be found together at one place and time presenting half so many variations in age. We entered a spacious lecture theatre, and upon inquiry as to what goes on within it, ascertained that men of really high standing have always been engaged in communicating the various knowledges professedly "always on hand" at this establishment. Of the resident instructors, certain of the students spoke to me privately in the very highest terms; and, indeed, it is well known that the Chemical Professor at Cirencester is recognized in all scientific circles as one of the soundest and most advanced chemists we have.

I have forgotten to mention the laboratory, which is, indeed, about the best arranged and best furnished branch of the whole establishment—a place of no mean interest, as having witnessed the labours of Way, Voelcker, and Church, and now the birthplace of a recently discovered mineral, a compound of cerium, named, after its discoverer, "Churchite." The botanic garden, too, is a great feature in the advantages and facilities here presented for scientific study. Some time before our visit, some mischievous fingers (for occasionally there are idle and evil-disposed young men to be found among the well-educated at Cirencester) had shifted lots of the name-labels of the plants, probably to test the practical knowledge of the botanical lecturer. I made out that nothing fanciful or pedagogic, nothing of mere book-learning separated from practical application, is permitted in the teaching of this College. Your chemical lectures you reduce to practice in the laboratory; every student going steadily through analyses of soils, manures, and feeding materials, and obtaining experimental acquaintance with all that chemistry has done for farming. Your botanical lectures you make practical to yourself in the garden, the park, and the farm fields. Your course of geology you apply in long geological excursions, observing dips, strikes, and anticlinal axes, faults and cleavages, dykes and curvatures, and rummaging every quarry, gravel-pit, and railway cutting for fossils. Your veterinary lectures you make available in the College Veterinary Hospital, which, with its boxes, dissecting rooms, and pharmacy, stands about a quarter of a mile from the College. Your mensuration and surveying class fits you for actual field-work with chain and theodolite, for timber measuring, and so on, around the neighbourhood. Then, while strict science is drilling and disciplining your mind, a large share of your time is engaged in the more strictly professional part of your studies. Drawing and account-keeping are, of course, items of great importance; keeping note-books of farm operations in another; and daily there is the practical "farm-class" instructed by the Agricultural Professor in some manipulation of tillage, some field or farmstead process, some detail in the management or commercial valuation of live stock. For the College has not only retained a few fields under its own control, for experimental purposes, but has the privilege of walking over and inspecting every inch of the 500 acres of what was (till lately) "the College Farm." Everything that goes on is open to the observation of the students, and everything receives its practical explanation on the spot. The purchases, the sales too, are all open and above-board; the day-book is publicly posted up in the entrance hall under the tower; and, fortunately, the present tenant having graduated at the College, is fully alive to the interests of the institution, and favourable to every proposal that may be of practical value to "the men." I need not speak of the roomy farm buildings on this holding: it is generally known in agricultural circles that a great deal of cash has been sunk on this unlucky piece of farming—until the present tenant entered upon the business, and, it is said, "really makes it pay." I suppose that good and thrifty management can accomplish here what good Gloucestershire husbandry does in the neighbourhood; and it is no slight advantage for learners to see how a man goes to work who is master of his occupation, makes the business "worth his while" and responsive in interest to his capital, and at the same time—rare merit indeed!—keeps the clearest, best arranged, and most elaborate of farm accounts. No single system of agriculture is here taught, out of one set of treatises, and by one sole professor; for men whose names are known in the rural world are engaged from time to time as occasional lecturers, each taking subjects with which he may be practically familiar. Of course, I should no more think of learning farming without taking part in the management of a *bona fide* business than I should expect to learn seamanship without tasting salt water on deck; but, as far as I can see, there can be no finer discipline than this College provides for training a young fellow intent upon acquiring all that Ceres herself knows of the art and principles of her favourite craft—the four sessions (equal to two years) at Cirencester, to be supplemented by a term of more specific practice, under some "leading agriculturist." I have seen more than enough of your lazy, with-difficulty-self-amusing young gents going from the strictest and tough work of a good academy to loiter, and lounge, and dog, or horse, or card and billiard away all the fruit of their education, simply from want of an incentive to exertion. Here, at Cirencester, it is evident that they may love it, as anyone might judge who had seen (as I did) the little *furore* excited by the posting up in the hall of an examiner's list of marks. Some folks, at any rate, are appreciating the value of this institution; for the number of students (generally ranging from fifty to eighty), I was told, is decidedly increasing. And I saw one young man who had been sent here by a nobleman (he is a son of one of that landlord's tenantry), on condition that he should learn what the professors could teach him, and then have the refusal of one of the best farms on that nobleman's estate. A bit, too, was shewn me of the positions in the world, in agricultural engineering, chemical, and all other lines of life taken up by men who, during the last twenty years, had earned their

ma" at this "seat of learning," this
t of the muses," where, indeed, "the
spring" is a pipe-drain, and the
culum" a one-horse harvest-cart. It
s that Ceres is by no means exorbitant
"terms;" you can be carried through
hing that is necessary (including the
club, as well as your chemical appara-
d books) for about £100 a-year; you
xuriate in a "private room" (civilizing
all paper with your pet prints of land-
or figures), for an extra charge of 20
s. You must obey rules, or you get
roperly reported at home, or confined
College grounds, or shut up within the
work of the building itself; but if you
a good boy," attend well to duties, and
first-rate progress, you can gain the
e. diploma or certificate, which testifies
the world of your having thoroughly
ed the subjects you set your wits at;
oreover, only get marks enough, and
ay win a scholarship of £40 per
, tenable during three sessions. To
s an "in-student" you must be six-
ears of age, and as an "out-student"
-one years of age. Your lectures and
s occupy four or five hours a-day; and
don't work hard on the farm at every
ble opportunity, and in your study every
g, at any rate you are sure to stick
o your note-books on Friday ("cram
"), if you hope to look well in Saturday
kly examination." I should think that
al sessional examinations are no joke
ny of the easy-going class of students.
as agriculture is concerned, it is not
the writing of answers to questions, or
sing papers on various practical
s, that may test the amount of savings
ur knowledge-box, but some agricul-
invited for the occasion, tries you for
in the field and farriery upon every
ment of management, hearing what you
o say about every crop and animal, and
ring your ability in connexion with
branch of farm business.

truck me that, though much good in-
ion must be obtainable out of the
ations of the daily farm classes, in which each student has to harness a horse, hold a plough, regulate a drill, adjust a winnowing-machine, and so on, yet a greater benefit would accrue from a more systematic following out of farm labours. There are many operations in tillage, weeding, manuring, manipulation of crops, feeding of cattle, sheep, and swine, &c., that might be entrusted solely to certain students or groups of students, and it is astonishing what an interest is given to the subject when you are made responsible in connexion with it; how, for instance, you observe as you never observed before, when you have allotted to you the task of foddering say a yard full of cattle every morning, or pulling, cleaning, slicing, and serving the turnips to a fold full of sheep every morning (or late in the day). And as the College holds some fields in its own management, I do not see why each one operation in tillage, stock-feeding, shepherding, should not be entrusted to say three students this week, three others next week, and so on, in rotation. There is nothing like actual work for bringing business home to you.

I must not leave out an interesting feature in our pleasing call at the College—namely, our attendance at evening prayers in the really handsome chapel. As a matter of necessary order, every student is expected to attend regularly, morning and evening; and nonconformist students (for several different "religions" must necessarily be represented where there are students from all quarters of the world) must have sensitive prejudices indeed if they can object to the litany and selected prayers from the Church of England ritual. The organ has been purchased, and lately improved, through a voluntary subscription got up by the musical among the students; and one of their number certainly does accompany the singing with great taste and admirable execution.

Before leaving Corinium, I gathered from sundry quarters, that the Gospel preached in the College chapel is of a sound practical type ("evangelical" some people call it), as free from bigotry as from undue ceremonialism, and such, that even old-fashioned North

British unbelievers in "rationalism" and in "prelacy" could "sit under" it with true satisfaction. We learned also that the discipline of the College is well maintained, and that the conduct of a great majority of the students is quite agreeable to the inhabitants of the town (as the Hon. W. L. Bathurst publicly declared it was to the owner of the park we so delighted in). Thus begun and ended my pleasant introduction to a "Royal" establishment that must become increasingly popular and prosperous the more the world knows how fitly it is training votaries of the rustic goddess--how well it bears its dignity as "the School of Ceres."

PAUPERISM AND ITS CURE.

MR DAVID CURROR, Chairman of the Parochial Board of the city of Edinburgh, has recently addressed a letter to the Lord Provost of that city, relative to the condition of the poor, and the means that should be taken to improve it. Mr Curror's letter contains some admirable suggestions, applicable not only to the particular case with which he deals, but also to pauperism in all parts of the kingdom, and for that reason we propose at present to follow out the course of his argument. Poor-rates fall heavily on the agricultural classes, and the relief of pauperism, so as to lessen it as far as possible, is an object in which those classes have a deep interest.

An Association was formed some months ago in Edinburgh for the purpose of improving the condition of the poor, and of concentrating the scattered efforts of the different benevolent societies existing in that city into one focus. Objections have been raised against the Association on the ground that it would relieve the rates, making the charitable ratepayer pay the rates of those who do not respond heartily to any appeal to their benevolence. But Mr Curror argues that this is an erroneous impression, and that so far from encouraging pauperism, or coming in conflict in any way with the legal poor-law administration, the Association will save persons who may be temporarily destitute from becoming permanently paupers, idle consumers of the industry of other people, and burdens for life on the ratepayers.

Mr Curror justly observes that of all the great political and social questions which have been agitated of late in this country, pauperism, while one which has been least attended to, is, in reality, perhaps the most important social question of all; and he proves this by adducing the progress which pauperism has made in Scotland during the last twenty-three years. In 1845—that is, the year before the passing of the Poor-law Amendment Act—the total number of paupers in Scotland was 68,541, to which must be added 26,894 casual poor relieved during the year; and the total cost of relief at that time for the year was £303,329, the population according to the census of 1841 being 2,620,000. In 1867 the number of paupers in Scotland had increased to 164,404 with 91,176 casual poor, involving a cost to the nation of £807,361, 5s. 6½d., the population at last census being 3,062,294. This enormous increase of pauperism during a period of general prosperity evidently shews that there is something radically wrong in system under which it has been fostered, and if it continues to increase in the same ratio during the next quarter of a century the consequences will be very serious. It will, as Mr Curror remarks, "drive the nation and its resources to desperation in the future, and ere long the difficulty may be to distinguish between the ratepayer and rate-recipient."

That the natural result of a legal Poor-law system is to foster pauperism, increase r-rates, and deteriorate the character opulation, has been repeatedly shewn tical economists; and once persons to the condition of paupers they , or rather never emerge from it under esent system. They are rendered ghly demoralized, lose all self-respect, come utterly incapable of taking any l step in the social scale. They have d the bottom, and there lie.

Curror divides poverty into three classes t, those "who are poor by the allotment vidence," including all infirm people, ed, and lunatic. The second class is sed of those who have been reduced to y by accident or other causes, which ntly lay aside the bread-winner of the from his work for a time, and it is this which he particularly desires to save, h the assistance of such an association t which has been formed in Edinburgh, inking into the condition of permanent rs. The third class are the self-imposed rs, people who won't work, but are by no ashamed to beg. It is this class which ways been the worst to manage, being the of all legislators and parochial boards. r Curror holds that there is a way in g even with this unmanageable class, , if thoroughly carried out, will prevent from continuing idle consumers of the ry of other people. He proceeds on llowing general principles—first, "that idle will be idle he ought to starve;" ext, "that if the idle, who are able, will he will not starve, but eat his own " Making workhouses such in reality ot in name, Mr Curror advocates the uction of labour of different kinds suit- each person's capabilities, instead of unavoidable idleness" which is the pre- ondition of those who resort to the ouse as a resource against starvation, n many cases, against the disagreeable ity of having to work outside for a living. rder to carry out this idea to its full it is necessary to have land attached h poorhouse, which shall be cultivated labour of the inmates not skilled in employments, or for whom work could not be found in the house. This industrial system, so far as out-of-door labour is concerned, has been carried out in the case of several workhouses in Ireland, and with good results to the inmates as well as the ratepayers. Connected with the new poorhouse which has been erected near Edinburgh, but not as yet in operation, there are 30 acres in garden cultivation, together with from 150 to 200 acres, which, if required, could either be farmed or let to the public. There is therefore ample scope for carrying out a self-supporting system of industrial employment, and should this be done Mr Curror expects that the visitor will see each pauper capable of working, busily engaged in their respective employments, or cultivating the land for the good of the house, and to relieve the pockets of the ratepayers to a considerable extent. Mr Curror's anticipations of the state of matters in the poor-house under a system of this kind are, that "the pauper baker" will be seen "baking the bread of the house; the pauper cook cooking the victuals; the pauper weaver weaving the cloth; the pauper tailor making the garments; the pauper shoemaker making the shoes; the pauper mason pointing the walls; the pauper painter ornamenting them; the pauper slater on the roofs; the pauper plumber upholding the rhones, or spouts; the pauper wright making the various utensils required in the house connected with his craft; the pauper smith sweating at the anvil; the pauper gardener working in the garden; the pauper farmer sowing and reaping; the pauper old wives keeping the infants; the pauper young wives washing, or working in the garden or fields; and the unskilled labourers, male and female, weeding, reaping, and at many other turns which an intelligent management will readily find and point out, and, in the midst of all the joyous song of industry, displacing the sulks of the city poorhouse."

Some may perhaps consider this a somewhat highly coloured picture of the state of matters under a judicious system of industrial employment; but if not actually presenting all the features which Mr Curror's presents, we have seen most of the points of which he makes mention in actual operation within the precincts of a workhouse, and the workhouse grounds, and the difference in the appearance of the inmates so employed, as compared with those condemned to "unavoidable idleness," was very obvious. The necessities of a poorhouse may not, indeed, require the exercise of all the mechanical arts enumerated by Mr Curror, but that is no reason why the inmates should remain in idleness. The products of their industry can be readily disposed of outside, nor need there be any fear that such would compete injuriously with the labour of the ordinary tradesman or artisan. Market-garden produce will always find a ready sale, without trenching in any way on the industry of the rent-paying producer.

Mr Curror does not lay any claim to novelty in the scheme which he has broached, and while claiming that it is a fair application of the spirit of the Poor-law Acts, he points to France, where beggars are at once taken before the magistrate, and sentenced to labour for the parochial boards on farms taken or purchased for the purpose of supplying reproductive work to persons of that kind. That it is impossible to go on as we have been doing in our treatment of pauperism is but too evident. Present measures increase the evil instead of ameliorating it in any degree, and the ultimate result, as Mr Curror has shewn, must be to swallow up the proceeds of the industry of those who continue to keep themselves out of the slough of pauperism, or to sink those into it who are unable to contend against the burden of supporting a large and constantly increasing section of the population in unproductive, demoralizing, idleness. It is a question for politicians and social reformers, and the importance of it is becoming greater and greater every day.

MALT AS FOOD FOR STOCK.

ARTIFICIAL food for live stock, and abundant supplies of it, are matters of great importance to the British farmer. The use of such food has now become an essential necessity in the case of all who would keep pace with the requirements of the age we live in; for we cannot now afford to wait, as our fathers could wait, for the slow results of a lower and less artificial mode of feeding. We have not merely more mouths to fill than our fathers had, but there is also a larger consumption of meat by each individual than there was at one period.

Some who are behind the age still follow the tardy system which has been followed, we may almost say, from the earliest times; others have advanced beyond this primitive stage, and produce artificial supplies of food by cultivating particular kinds of plants, suitable for the purpose of stock feeding; while a third class have added to the supplies furnished by home cultivation, other articles drawn from the resources of foreign lands, increasing thereby the value of home produce, and enriching our own soils. Thus in the linseed which is imported from India, Russia, Egypt, and other countries; in the cotton cake which comes to us from America, we have the productions of foreign soils made use of, first, to increase our supplies of meat; and next, securing an important addition to our manure heaps, by the use of those foreign grown materials as the food of our live stock, and in this way fertilizing our own soils.

But while fully sensible of the value of linseed, oilcake, and other materials received from foreign countries, which are employed as food for live-stock, there are other descriptions of food which we ought not to lose sight of. Those to which we refer are of home growth—the produce of our own soils—and therefore eminently deserving attention. At one time it would have been accounted sacrilege to have used grain in any way than as human food. To give it sts or sheep, unless under rare condi- was altogether out of the question; spite all our progress there still exists ant of "the old school" who continue ally to hold such an opinion as that ve indicated, and to see a hopeless for the British farmer when he has to d with the foreigner in the produc- f grain. But it is now a recognised at a considerable proportion of the rown in this country, especially secon- nd inferior qualities, can be turned to ble account when converted into food stock. Of course, when used in fat- bullocks, sheep, or pigs, grain is still, h not directly, human food; the only ce being that it takes another shape, lks to market on four feet, instead of carried in sacks.

he varieties of grain which are grown country have been used in this manner, these barley occupies a high place. converted into malt it becomes, either or indirectly, more effective as a cattle an it is in the natural state. We are that Mr Lawes and some other ts hold a contrary opinion, but against e have to place the actual experience mber of practical men, who have used rgely in feeding live stock. Mr Isaac has recently published in the *Mark xpress* a valuable account of his ex- e in the use of non-dried malt, as r stock, extending over a period of years. Mr Seaman says:—

e use of non-dried wheat and barley-malt as herbivorous animals, extend over a period of , ending 1865. 2. Until 1860, horses alone the subjects of my experience. 3. 1861, a 200 lambing-ewes and their lambs were fed n-dried wheat malt. The flock continued during the whole season; the lambs fatted at the age of twelve weeks were sold at from 4s. each. 4. At the end of the next two years, d wheat and barley malt, as food for cattle p, had come into general use in this neigh- l (Essex), increasing and increasing until 1865, when the number of sheep within an 0 miles of this borough feeding upon the food eased to upwards of 12,000, producing upwards of 30,000 lb. of mutton weekly. 5. During the winter, 1864-5, and following spring and summer, the weekly consumption of non-dried wheat and barley malt on the farms of one proprietor amounted to 25 sacks weekly, and upon the farms of another to 16 sacks weekly, as food for sheep, lambs, horses, and oxen. Failure of the roots and grass-crops during the four years ending 1865, the increasing rise in the price of all kinds of cakes, and the low price of wheat and barley being the stockmaster's main inducement for substituting this new kind of cattle food. 6. December, discontinued in consequence of excise interference.

After giving a tabulated statement, shewing the comparative value of non-dried malt and raw grain as food for sheep and other animals, Mr Seaman proceeds as follows:—

Ten oxen, each consuming, non-dried malt the produce of 1 stone of raw barley, straw chaff, and 1½ bushel of turnips daily, will produce 100 stone of beef in ten weeks; whereas fifteen weeks are required to produce the same quantity of beef upon the same number of oxen with any weight of other mixed food; or 6 lb. of linseed cake, in addition to the stone of raw grain, will produce only the same quantity of beef in the same time as the non-dried malted grain. A horse daily consuming non-dried malt, the produce of 1 stone of raw grain, with 10 lb. of hay, will increase 15 stone in weight in ten weeks; whereas, with raw grain, it becomes diseased, hair falls from the skin, loses eyesight, is attacked with grease, and becomes a useless animal. A horse debilitated by disease is quickly restored to health by the use of non-dried malt; but raw barley or wheat will destroy life. Sows and sucking pigs may be fattened with non-dried malt; while raw barley will vitiate the milk, and poison the young pig. For producing pork upon old pigs, raw barley meal is superior to non-dried malt.

A horse at rest and required to be made fat for market, non-dried wheat and barley malt is the only single food consistent with the health of the animal that can be used: no experienced grazier would think of using raw barley for the purpose; an aggravated skin disease, depilation, or eye disease, would be the attending consequences. Whereas non-dried malt will restore a debilitated horse to health: raw barley will aggravate the disease. Non-dried malt is most wholesome and nutritious food for lambing ewes and their lambs; but raw barley is deleterious. Non-dried malt will restore a diseased flock to health; while raw barley will have prejudicial effects. Non-dried malt alone will fatten the leanest sheep in twelve weeks. The only exception to the use of non-dried malt in preference to raw grain is in the case of fattening pigs. The first week of using non-dried malt, the produce of 1 lb. of raw grain daily will be found to have produced 2 lb. of mutton upon each sheep: this cannot be said of any other single or mixed food. Every experienced grazier knows that sheep or oxen add but little weight to the carcase during the first month of fattening when fed upon the ordinary food, but from the easy digestibility of non-dried malt an immediate and rapid increase of flesh is the result. The evidence of farmers shews that oxen are frequently not so good at the end as at the beginning of the first month. Sheep are fed in companies or flocks in open fields from mangers common to the whole; and for the safety of the lives of the sheep it is important that, whilst nutritious, their food should be of a harmless nature: hence the superiority of malted over raw grain; the former is harmless if eaten to excess; the latter poisons in the small quantity of a pint taken at one meal.

Mr Seaman also supplies a detailed statement of the expense incurred in fattening two lots of bullocks at Wenden Hall, Essex, and the results, as shewn in the prices realized for each lot respectively. The time during which the two lots were fed extended from June 30 to December 30, or six months, and this Mr Seaman divides into three periods. During the first period of thirteen weeks, one lot of bullocks were on grass, linseed-cake 6 lb. each daily, and hay and straw chaff to the value of 2s. per head daily; the total cost per head per week being 10s. 1d. The second period embraced four weeks, during which the daily allowance for each bullock was—Linseed-cake, 6 lb.; beanmeal, 8 lb.; hay and straw chaff: total weekly cost of each bullock, 12s. 11d. During the third period of nine weeks, each bullock got daily 7 lb. linseed-cake, 16 lb. beanmeal, and hay and straw chaff, involving altogether an expenditure of 15s. 5d. per head weekly; the average cost of feeding during the six months being £16 per head.

The second lot during the first period of thirteen weeks were fed solely on grass; the weekly cost of each bullock being estimated at 4s. 6d. During the second period, or the four weeks of October, each bullock, in addition to grass, got daily 7 lb. non-dried malt, the produce of a half peck of raw barley, with straw chaff; the weekly cost of each bullock being 7s. 6d. The daily allowance to each bullock during the last period, or nine weeks, consisted of 14 lb. non-dried malt, the produce of one peck of raw barley together with straw chaff; the total weekly cost of each animal being 7s. 6d. Under the latter system the average cost of feeding each bullock was £7, 16s., so that they cost £8, 5s. 6d. per head less than the first lot. But this was not all the difference; for the bullocks fed on non-dried malt left a profit of £3, 6s. 2d., while those fed without malt were sold at a loss of £6, 10s. 9d. per head; being virtually a balance in favour of the malt-fed bullocks of £9, 16s. 11d. per head.

Mr Seaman's statements are, we consider, very conclusive as to the value of malt as part of the food used in fattening cattle, but he is not singular in his opinions. In 1863 a deputation waited on Mr Gladstone, then Chancellor of the Exchequer, for the purpose of stating their views on the value of malt as food for live stock, and the consequent injustice of the malt-tax, which prevents farmers from using it so freely as they ought to do in that way. On that occasion Mr Booth, of Warlaby, declared, from his personal experience, that "malt is superior to any other article for feeding cattle up to the very tip-top condition to which they require to be brought when they are intended for the show-yard." Mr Booth further stated that at that time he could "get good barley for malting at £7 per ton, and the malting would bring the cost up to £8. I am now paying £10 per ton for linseed cake, being, of course, obliged to put up with the manufactured article which is offered me; and I should much prefer using malt, if the law permitted me to do so, for the feeding of stock."

But it is needless multiplying authorities on this question. Practical men are thoroughly satisfied that it would be for their advantage to use malt in feeding stock, but the amount of duty is a virtual prohibition. A French agriculturist, however, may come over to England, and, after purchasing a lot of English sheep, purchase also a quantity of English malt for the purpose of feeding them. On that malt he would be allowed a drawback of the whole amount of the duty; and having fattened his sheep he could send them to the London market, and compete with the English farmer, who dare not use the very same article unless on payment of a tax of

l. per qr. This is strange justice, more lly when the Legislature has exposed farmers to competition with the whole and it is surely only a matter of simple y on the part of the Legislature that ediments shall be removed which tend per British farmers in meeting that com- n which has been forced upon them. Except the mere amount of revenue derived from it, there is not a single plea which can be urged in favour of the malt-tax; and it says little for any government, no matter what political creed it may profess, when it suffers even the consideration of revenue to stand in the way of doing justice to the agriculturists of this country.

THE SEASON AND ITS LABOURS.

IE agricultural year does not commence with New-Year's Day. When ops of the season have been harvested rmer begins his preparations for those ther year; the entire series of opera- forming the links, as it were, of an s chain which cannot be broken with- rowing the whole machinery or system out r. At this time, owing to the favourable er, a considerable proportion of the la- appertaining to the agricultural new year a forward state, or actually finished. heat seeding could not have been con- l under more favourable circumstances, he green verdure of early-sown fields noticeable feature in the agricultural ape. The stubble lands, which carried crops during the past season, and on it is intended to grow roots next year, in most cases, been turned up, to benefit influence of the weather during the months; and the reports from all parts country inform us that "farm-work is vanced for the season."

far well; but while we know that in instances the preparative work for an- year's root crops has been very effi- done, it is not saying too much, we when we state our conviction that a reat deal of land has been simply turned and nothing more. The whitened es of last crop have been put out of sight, at is the most which has been effected. is a class of farmers who seem to above all things going into the soil beyond a few inches. They appear to imagine that there is something positively injurious in all that lies beyond 7 or 8 inches from the surface, and that were they to turn any part of this up to the light of day, their chance of a crop would be very small. Nor does this arise in all cases from want of sufficient horse-power to turn up a deep furrow, for we have seen four powerful horses in a team with a plough behind them, leisurely turning up some 8 or 9 inches of nice free loam, just the kind of land that a pair of smart horses, driven by a smart ploughman, could have turned up to a much greater depth with the utmost ease. On one occasion we met with a very severe trial to our patience from the propensity on the part of some men to plough light. On commencing to plough a stubble field, which we were anxious to get thoroughly gone into, as it had only been scratch-ploughed previously for time out of mind, and there was abundance of depth to work upon, we set the ploughs—which were Howard's HH wheel-ploughs—at the depth we had resolved upon. After seeing the ploughs fairly started, and everything going on well, we left the field to look after other matters, but on returning soon after, we soon saw that the depth had not been kept, and on examination found every plough altered to suit that depth of furrow to which the men had been accustomed. We again set the ploughs to work at the proper depth, and again the same alteration was made when our back was turned, and it was thought we were out of the way for a time; nor could we keep the men from doing this until we threatened to discharge every man of them on the spot, that we got the work done according to our ideas. The sole reasons they assigned were, that the horses would be injured by the extra depth of furrow; and that they had been ploughing all their lives, and had never ploughed so deep before. We mention this, because it will happen in some parts, that although a master may direct his men to plough to a certain depth, they will not do it, unless strictly looked after, if they have not been accustomed to that style of work. On the other hand, where deep ploughing is understood, the men evince a pleasure and pride in going well into the land, and such men require no looking after as regards this matter.

When ploughing with horses is the rule, the Tweeddale plough, as we have often stated, is one of the most efficient—perhaps we should say the most efficient—we possess for turning over the winter furrow, and any spring cross-ploughings that may be required in preparing land for root crops. It is a heavy-looking but a light working implement, and a ploughman can turn over a furrow 15 to 16 inches deep and 12 to 14 inches wide with a Tweeddale plough, with as much ease as he can turn over a furrow not much more than half the depth with an ordinary swing plough. The Marquis of Tweeddale conferred an inestimable benefit on agriculture when he invented that implement, coupled with his subsoil trench-plough; and Mr Henry Stephens conferred nearly as great a benefit when he described the details and results of the system of cultivation effected by those implements in his work on "Yester Deep Land Culture."

The steam cultivators which are now being introduced into nearly all parts of the country will revolutionize the old feelings, wherever such exist, in favour of scratch-work ploughing. Steam can't scratch the land; it must smash it up, disintegrating and comminuting it in a style which mere horse-work can rarely accomplish. Lord Tweeddale has, indeed, challenged a trial between his implements and steam cultivators, which has not been accepted; but although we have no doubt his lordship would hold his own in a very satisfactory manner, we by no means seek to depreciate the Tweeddale ploughs—for we value them highly—when we say that, taking the country at large, it is to steam and steam cultivators that we look for that improvement in cultivation which is so much required, even in some of our best farmed districts, and by means of which, to use the language of a writer in the *Times* with reference to steam cultivation, "we may be able before long to feed our population, independent of American prairies, and no longer import supplies equal to a fourth of our harvest."

But stubble ploughing is only one department of the work of the season, preparatory to the growth of next year's crops. Leas have to be turned over, and this has already been done in several places. Ploughing matches, too, are being announced, and the various trials of skill in this department among the rival ploughmen will, as usual, excite much interest in their respective districts. There is no doubt that a ploughing match, with its well appointed, active-moving teams, and its eager crowds of critical spectators, is a pleasing scene, at least to the agricultural eye; but we may ask, have those matches been at all times successful in promoting a good and efficient style of ploughing? Is it not the case that fine work has received the approval of the judges much more frequently than what we call, in contradistinction to it—solid work; and that the successful fine ploughing has been produced at the expense of efficiency? The "high-crested" ploughing, so much patronized at ploughing matches, is a mere delusion. It looks nice, no doubt, but it is false ploughing; underneath the pretty looking surface lies a series of hard, unturned ridges, and the result is the production of less grain and straw than would be obtained were the ploughing done on proper principles. This is not a matter of opinion, it is a settled fact, and as it is grain and straw we require, it follows that a style of ploughing lea, which is not calculated to afford such produce, should neither be practised nor encouraged. But,

standing all that has been said against
ested ploughing, it still exists, and
cy continues to be sacrificed for that
ıas merely sweetness to the eye to re-
nd it.

following particulars, taken from a
in the *Journal of Agriculture*, con-
d from experiments made on different
s at a ploughing match, will serve to
ıe comparative efficiency of the high-
, as compared with the rectangular
f ploughing, looking upon it as an
on for turning over the soil in the best
r for the reception of the seed, and
sequent growth of plants. We shall
st the case of a plough which made
ested work. The depth of the furrow on the land side was 6 inches, and on the off-side, 4½ inches; the width of the furrow was 8 inches; power 5¼ cwt.; soil turned, 42 square inches; soil turned to 1 cwt. of power, 8 inches. Now, take the case of a plough which made rectangular work. The depth of furrow, in this instance, both on the land-side and off-side was alike, namely 6 inches; the width of furrow, 9 inches; the power 4 cwt.; soil turned, 54 square inches; and the proportion of soil turned to each 1 cwt. of power, was 13½ square inches. It is impossible to shew more plainly the practical difference between those two styles of ploughing lea; for in the latter instance, that of the rectangular furrow, there was the largest amount of soil turned over with the least draught.

CATTLE DISEASE INQUIRY.

he remarks which appeared in our last
mber on the Report of the Directors
Scottish Chamber of Agriculture,
iced the recommendations offered by
regarding the transit of live stock, and
ulation of markets.

three sections which come next in
to those already noticed refer to the
on which the Directors consider foreign,
and fat cattle, should be admitted to
untry. They were as follows :—

> That foreign cattle should only be admitted
> country at ports specially sanctioned by order
> 'rivy Council.
>
> That foreign cattle should not be permitted to
> th home cattle, unless under the conditions
> l in next article; that foreign fat cattle, and
> e from an unclean or infected country, should
> uded from every market save a licensed fat
> to be held at or near the port of debarkation
> ediate sale for slaughter of such foreign cattle,
> ıt such markets should be under thorough
> nent supervision.
>
> That foreign store cattle imported from a clean
> , and which shall have been twenty-eight days
> ossession of the importer on his own premises,
> ı they shall be taken under license, and direct
> e port of debarkation, may be shewn for sale
> tore market or public sale in the kingdom;
> these conditions being complied with, should
> e same freedom of transit as is allowed to home
> ttle.

as upon these recommendations that the desultory discussion turned subsequent to the reading of the Report, the main point at issue being whether foreign stock should be imported under certain stringent restrictions, and after a time allowed to be exposed for sale at fairs, and otherwise mix with home-bred stock, or killed at once at the port where they were landed. It is evident that if all foreign cattle are killed immediately on their arrival in this country, store beasts, which must be fatted before they are ready for slaughter, will be practically excluded from our ports. In taking this point, therefore, into consideration, it was necessary to avoid everything which might be used as a pretext by those who have asserted in Parliament and out of it, that the defensive measures supported by agriculturists with relation to the importation of diseased foreign stock, are merely designed to cover a return to protection against foreign competition. We think there is no doubt it was a feeling of this kind which prompted the majority of those present to support the recommendations of the Directors against the motion which was made to the effect that all foreign cattle should be slaughtered at the port of debarkation. Nor does the decision of the Chamber militate against the principle of the Metropolitan Foreign Cattle Market Bill of last session, which we hope will be re-introduced into the new Parliament. The Metropolitan Market is chiefly for the sale of fat stock, suitable for immediate use, and it is only cattle of that kind which should be landed at London. Store cattle should be sent to other ports more convenient to the grazing districts, and there subjected to such regulations as will reduce the risk of infection from that source to a minimum point.

It may be granted that pleuro-pneumonia was known in the country before the free importation of foreign cattle under the tariff of 1842. Youatt describes it in his work on "Cattle," which was published in 1834; but it is also the fact that it was not so prevalent at that time as it has become since the unrestricted introduction of foreign cattle, combined with the extension of a different system of cattle transit from that which previously prevailed, and the effect of which, to say the least, has been to predispose cattle to the action of the disease, and to hasten "the development of such disease, the germs of which at the time are latent in the system." So says Professor Simonds in his report to the Scottish Chamber; and we have also to take into account the risk which healthy stock run of being infected from diseased animals being mixed up with them in railway trucks or on board steamboats, or even having preceded them, without steps having been taken to cleanse and disinfect the trucks, &c., after carrying the diseased animals. There has, in fact, been a combination of circumstances at work since 1842, all tending to spread this disease, and this was proved when an entire stop was put to cattle traffic during the prevalence of rinderpest in this country. The causes which spread disease were removed in consequence of the measures taken at that time, and pleuro-pneumonia and other contagious diseases became almost extinct while the restrictions lasted. Referring to this well known fact, Mr Finlay Dun states in his replies to the Chamber that "Mr Smith, M.R.C.V.S., in a paper on the cattle plague in Norfolk, read at the last meeting of the British Association, stated that, from the books of the Norfolk Farmers' Cattle Insurance Company, he finds that during the five years from 1858 to 1862 the mortality amongst cattle from pleuro-pneumonia alone ranged from 46½ to 63½ per cent.; in 1863 and 1864 it was 35 per cent.; in 1865 owing probably to the caution which fear of the cattle plague had already inspired, the losses fell to 26 per cent.; under the stringent restrictions of 1866 the mortality from pleuro-pneumonia in the Norfolk Insurance Company was only 1 per cent.! The restrictions especially during the autumn months of 1867 becoming less severe, the losses rose to 8 per cent.; whilst with the return to open markets and unrestricted traffic, the first seven and a-half months of 1868 (to 17th August) indicated a loss of 30 per cent."

That contagious pleuro-pneumonia was well known on the Continent long before it proved the fatal scourge it has become in this country during the last quarter of a century, will be seen on referring to Youatt's book, and it is remarkable that the very causes which have been alleged as increasing its virulence, and even originating the disease in this country, are given as the causes of its appearance at that time in several parts of the Continent.

There is one point to be noticed in the suggestion of the Scottish Chamber—namely, that foreign store cattle "which shall have been twenty-eight days in the possession of the importer on his own premises may be shewn for sale in any store market," &c. The twenty-eight days specified were fixed upon, we believe, more with reference to rinderpest than pleuro-pneumonia, which remains latent much longer than cattle-plague. Two months seem to be considered by the veterinarians consulted the earliest period when it would be safe to give a clear bill of health in respect to pleuro-pneumonia.

We find we cannot at present enter into all the points brought forward in the replies to the Chamber so fully as we could wish, but we trust that the entire Report and replies will be published for the benefit of the public, and not merely for the use of the members of the Chamber.

SHEEP FARMING.

IE following remarks have been contributed by a correspondent who, iis position, is well qualified to express inion on the important subject of which ats, and we insert his remarks in order it the opinions of others, as there are s "two sides to a question" of this —

Ve have recently had opportunity of g to parties attending our sheep and markets. This is the *third* bad flockmasters have had; and when we f prices getting worse and worse, we adily understand the hardship of a pro- d reverse of fortune. They complain ly, and we have reason to say the case ny sheep-farmers looks now like one for e consideration, and failing that, for discussion. We have taken the liberty, than once, of suggesting the propriety appeal to landlords, whose province, e believe whose true interest, it is to nto this question. It may be, as we have informed, that some proprietors have an- d these appeals with 'You have had a period of prosperity, and can afford a ears of adversity,' or, more curtly, 'If were lowered now, during bad times, would require to be raised during good.' we venture to say that this summary od of disposing of a widespread griev- will not be universally adopted. Pro- rs are quite alive to the position of tenants, and know to a nicety how much are affected by the present low range of . If sheep-walks had been all held long leases, and the occupants entered m under circumstances similar to those present day, we could understand the rds' refusal to listen to and rejection of ch overtures and appeals; for it is us enough, although taxes, wages, ing materials, and the entire ma- y of the farm has become much more sive than formerly, yet the run of luck, and highly remunerative returns which early entrants to grazings have enjoyed, should compensate all and more than the loss which they have sustained. But it is not here that the shoe pinches. It is the late entrants that are suffering, those tenants who had the misfortune to take farms while the American war lasted, and, it may be, just when the demand for mutton and wool had attained the culminating point. All was bright and propitious then. Nobody saw, or at all events, appeared to understand that scarcity of cotton, and latent but widespread speculation were the true causes of the graziers' prosperity. Even politician proprietors and statesmen were alike shortsighted on the point. We have heard them say, and have no doubt they were perfectly honest in their convictions, that there were elements at work in the world which had altered the value of food, raiment, and labour, or, in other words, which had increased the price of produce and wages of the farm in all time coming. Buoyed up with such expectations, the natural consequence was, the keenest competition for sheep walks, and an unprecedented increase in their value. Fifty to one hundred per cent., and even more than double the old rent, was an advance of common occurrence. When we take this, and the large capital required to take over stock, at its immensely enhanced value into account, the present position of late entrants to sheepwalks is easily understood. But whatever the terms of these comparatively recent leases may be, we opine there is only one way of dealing with them. The circumstances—the prices of sheep and wool are entirely altered; and we think the case of every individual should be duly considered, and that such relief should be granted, as the peculiar position of each tenant may warrant and require.

If we take prices current previous to 1866 or an average of the prices of the preceding years, the data which late entrants must have adopted, and contrast those with the prices of the autumn of '66, '67, and '68, the alteration in the income of such tenants and in the actual value of their farms, appear to be something extraordinary. In fact, it would seem the progressive rise in the value of meat and wool previous to Whitsunday 1866 was quite an exceptional event, and has proved a false standard of the worth of these commodities; and hence it is obvious enough that while tenants who have had the misfortune to take farms during this exceptional period must be sufferers for the present, their farms must necessarily soon be re-let at reduced rents. And it is for proprietors to consider whether present occupants in common fairness should not participate in such reduction. We have put the case thus briefly but emphatically, because we know many tenants are paying 50 to 100 per cent beyond the present value of their sheep walks."

THE UNDEVELOPED POWER OF BRITISH AGRICULTURE.[*]

BY MR J. J. MECHI.

If the land of Britain were owned by such noblemen and gentlemen as I could name, and farmed by such members of our Club as I could designate, there would be much less need for my reading this paper; but we have to deal this evening with the whole area of the United Kingdom, containing 77,513,585 acres, the utilized portion of it, 45,491,097 acres, being held or occupied by no less than 1,069,452 farmers, of which Ireland claims nearly 600,000.

I think we shall all agree that the wealth, power, dignity, and happiness of this kingdom depend fully as much, or probably more, on the proper use of its soil as on the utilization of its other industrial arts, and its mines, fisheries, commerce, and shipping. We must admit that the stomach is the predominant power, demanding regular and continuous supplies, to procure which, at whatever cost, all other interests must subserve or succumb.

We have very certain proof of this, for although always dependent on foreigners for one-third (more or less) of our daily bread, an increase of that dependency, caused by a failure in our harvest, knocks down consols, depreciates every other security, involves us in financial and commercial panics and embarrassments, stops progress, and throws out of employ large masses of our industrial population.

In fact, it comes to this, that the greater or less home production of our food acts barometrically for good or for evil on the national welfare. Admitting this to be so, it follows that it is our primary duty and interest to extract from the soil by every profitable means in our power the greatest possible amount of human food, just as by improved, costly, and scientific means and machinery we are enabled to clothe ourselves and other nations in cheap and plentiful clothing, or supply them with other requisite manufactures. My object, therefore, in reading this paper, is to inquire whether we have developed sufficiently or perfectly our agricultural power, and if not, why not, and how great is our opportunity of so doing?

British agriculture (as regards landowners, tenants, land stewards, and lawyers) is at present in a transition state. It may be represented, jocularly, as old Mr John Bull, jogging along on the old road, looking wistfully but doubtingly at the new road which steam-power has made for him, but which is still unused except by a few daring agriculturists, who seem to be calling out to the old gentleman—"Come on, don't be afraid: see how fast, safe, and cheap we go; this is the right road to profit, you will find it better and cheaper than the old one—come and try." But the old gentleman shakes his head and says, "I shall take time to consider of it, and make up my mind; for your new ways require much capital and give much more trouble than the old ones."

Joking apart, I ventured to suggest this subject for discussion by our Club, because I have an honest conviction, resulting from 25 years of practice and observation, that our agriculture still presents a vast field for the profitable investment of greatly increased skill and capital.

Let us take stock of our present agricultural position, remembering that our acres have no children, and that our population has increased from 10 millions to 30 millions since the year 1800.

The present food-producing power of British agriculture is shewn in the Board of Trade returns for 1866, issued in 1867. According to them, the whole area of the United Kingdom consists of 77,513,585 acres, and our population 30,315,072; but only 45,491,097 acres are accounted for as under crops,

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[*] A paper read before the London Central Farmers' Club.

excluding mountain and waste; so that we have still a considerable portion of 32 millions of acres to operate upon. In Ireland alone there are 4,423,340 acres in bog and waste. We have in

	Acres.	Occupiers.
England	32,590,397	338,588
Scotland	19,639,377	78,792
Wales	4,734,486	52,072
Ireland	20,322,641	600,000
Isle of Man	180,000	
Jersey	28,717	
Guernsey, &c.	17,967	
Total area	77,513,585	

The croping of the United Kingdom in the area under cultivation is as follows :—

	Acres.
Corn crops	11,431,440
Root and green crops	4,951,796
Clover and Grass	5,679,433
Bare fallow	953,998
	23,016,667
Permanent pasture not broken up in rotation, exclusive of heath or mountain land	22,156,541
Total under cultivation	45,491,097

In the United Kingdom we have of live stock :— Cattle, 8,731,473; sheep, 33,817,951; pigs, 4,221,100.

We have no estimate in England of the value of our live stock, but the returns in Ireland are more minute and explicit. There the valuation is, per head of

	£	s.	d.
Cattle (3,629,352)	£6	10	0
Sheep (4,822,244)	1	2	0
Pigs (852,443)	1	5	0
Horses	8	0	0

The live stock of Ireland, including 522,865 horses, is valued at £34,000,000. I hope our Board of Trade returns for England will some day be much more minute, and give us also the number of horses and estimated value of live stock. We also ought to know how much of our country is occupied by roads, canals, railways, rivers, lakes, fences, woods, and towns, cities, and villages, &c., that we might more accurately estimate our undeveloped power of cultivation. It will be noticed in the foregoing returns that in pluvial Ireland hairy animals greatly exceed the woolly ones, while the latter are much in excess in dry and cereal England. Wet and mild climates are not so well suited to the woolly tribe. Cattle also greatly preponderate in English pluvial counties.

How much of Human Food does the Soil of Britain Yield, and what is its Money Value received by the British Farmer?

Unfortunately, our food statistics are at present so general and incomplete, that there are no data for an exact computation. I will, however, endeavour to test it by a roughly-estimated consumption (per head of the population) of home-produced food and drink—I mean the sum that reaches the farmer's pocket, independent of malt-tax or spirit-tax, or trade and intermediate profits and charges.

Annual consumption per head.

	£	s.	d.	
Wheat, 4 bushels at 6s. 6d.	£1	6	0	£39,000,000
Meat, 52 lb., at 6½d.	1	8	2	42,250,000
Potatoes	0	10	0	15,000,000
Milk, butter, cheese, eggs, and poultry	0	11	0	16,500,000
Oats (as meal), &c.	0	5	0	7,500,000
Barley, hops (as beer, &c.)	0	11	0	16,500,000
Fruit and vegetables	0	2	0	3,000,000
	£4	13	2	£130,750,000

Potatoes in Ireland and oatmeal in Scotland and the North of England are the principal articles of food. Oatmeal is also consumed in Ireland. England consumes more wheat and meat per head than either Scotland or Ireland.

Our population consume, in addition to the above, a large amount of foreign agricultural produce, probably to the extent of £1, 5s. per head, exclusive of tea, sugar, or coffee.

Consumed by 30,000,000 of population, at £4, 13s. 2d. per head	£139,750,000
Wool, hides, tallow, and offal	10,000,000
Hay and corn consumed by 500,000 horses (non-agricultural), at £20 per annum	10,000,000
60,000 horses (non-agricultural) sold annually by farmers, at £25 each	1,500,000
	£161,200,000

This would give about £3, 16s. per acre for the whole of the United Kingdom (returned by the Board of Trade at 45,500,000 of acres under cultivation).

There are probably a million of farm horses, consuming annually £20,000,000 of farm produce, for which the farmer gets no money payment. I therefore take no account of this, nor of the horses he rears for farm use. That million of horses probably consume the produce of 5,000,000 acres, landlord's measure.

M. Lavergne, the celebrated French agricultural statistician, in his valuable book "On the Rural Economy of England," published in 1855 by Blackwood, and ably translated by a Scotch farmer, thus estimates our gross acreable produce :—

	£	s.	d.	
England	£3	15	0	per acre.
Lowlands of Scotland Ireland, and Wales	1	17	6	,,
Highlands of Scotland	0	8	4	,,

His total agrees very nearly with mine. He puts it at £164,000,000, half animal, half vegetable; but his estimate of meat at 8d. per lb. is too high by 1½d. I estimate three-fifths vegetable, two-fifths animal. I would strongly recommend a perusal of his valuable work. Although M. Lavergne considers France equal in soil and climate with our own, he estimates French produce at only one-half the acreable value of ours. This is somewhat to our credit by comparison. I roughly estimate our—

	Acres.	Value.
Corn crops...........	11,431,940	£83,000,000
Potato do............	1,155,609	20,000,000
Green and root do.	3,400,000	10,000,000
Clover and grass ...	5,679,433	17,000,000
Bare fallow..........	953,998	...
	22,017,167	130,000,000
Permanent pasture, exclusive of mountain and waste..............	22,156,441	50,000,000
	44,173,608	180,000,000
Consumed by one million of farm horses, for which the farmer receives no money payment..........................		20,000,000
		£160,000,000

M. Lavergne estimates the rent of our land as follows:—

England	20s. per acre.
Lowlands of Scotland and Wales...	10s. ,,
Highlands of Scotland	10d. ,,
Three-fourths of Ireland..............	13s. ,,
North-west of Ireland..................	5s. ,,
General average	13s. ,,

Our Board of Trade returns take no account of mountain, heath, or waste, therefore probably the average rental of the 44½ millions of acres so returned would be 20s. per acre (see M'Culloch, Porter, and Spackman), and the value of the land £25 per acre.

Having stated what is, I think, about our acreable agricultural production, I shall endeavour to point out presently what it might be if we brought to bear upon the improvement of the soil a great increase of capital and intelligence. But such results can only be produced gradually. I know many intelligent farmers who hired their farms when steam cultivators, steam engines, and other expensive machinery were not much in vogue. Such men admit candidly that they would, if they could, now greatly diminish their holdings, so that their capital would be more in proportion to modern agricultural requirements, especially to the keeping of more stock fed on imported food. Landowners, too, are gradually arriving at similar conclusions in regard to their estates. These changes and investments will necessitate a valuation for improvement and security of tenure by lease, and probably a modification and enlarged freedom of action as regards entailed estates.

I am not so sanguine as to expect that such vast changes as I indicate and consider necessary and profitable can take place, except gradually, by the force of opinion and discussion, and by the necessity for meeting the pressure for food for our rapidly increasing population.

WHAT MIGHT THE SOIL OF BRITAIN PRODUCE?

I have no difficulty in answering this question. The soil of Tiptree, poor as it is, and naturally much below the average of the kingdom in quality, has enlightened me on this matter. The 25 years of practical residential experience which I have had there has taught me that Britain could profitably feed all her children without foreign aid, if she chose to do so. This is no dream or speculation, it is a fact, true and indisputable; but I do not expect every one to believe it, but rather the reverse. Tiptree Hall Farm is an instance of increased development with profit. Rent, farmer's capital, and employment of labour have been all doubled, and the produce and acreable profit proportionally increased. This year the produce is as follows, the farm being 170 acres, landlord's measure:—Wheat, 450 qrs.; barley, 27; oats, 40; beans, 18; peas (for London), £66 net; red clover hay and grass hay, 30 tons; 6 acres of good mangold, 150 tons; and 6 of strong green tares, followed by cabbage; some 20 acres of rape, white turnip, and cabbage. The live stock consists of 40 bullocks and 225 sheep.

The average produce of wheat at Tiptree is 40 bushels per acre; this good year it is 48 bushels per acre. The average of the United Kingdom is 27¼ bushels; this good year, 32 bushels per acre. The percentage of wheat at Tiptree is 33 of the whole farm, of the United Kingdom only 9 per cent.

At Tiptree permanent pasture is only 8 per cent.; the United Kingdom 48 per cent.

The rent of Tiptree is 40s. per acre; the rent of the United Kingdom 20s. per acre.

The gross produce at Tiptree is equal to six rents per acre (£12); the gross produce of the United Kingdom, 3¾ rents per acre (£3, 15s).

The meat made at Tiptree is £5 per acre; the meat made in the United Kingdom, £1 per acre.

The quantity of manure made exactly follows the quantity of meat made, therefore Tiptree makes five times as much manure per acre as the United Kingdom. Can we, then, wonder at its produce being greater?

The labour employed at Tiptree is 50s. per acre; the labour of the United Kingdom, probably only 15s. per acre.

The tenant's capital at Tiptree is £17 per acre; that of the United Kingdom under £5.

Corn, cake, &c., consumed by live stock at Tiptree, corn, cake, &c., consumed per acre in the ingdom, 13s. per acre.

ing to the Tiptree returns, our 44,500,000 of ld give £534,000,000; our present returns ,000—increase, £364,000,000.

: need not be alarmed by this prospect of ncrease. There is no fear of our arriving too his happy condition. It will take centuries e the impeding causes of non-improvement, n that period (assuming that we have not yet n reached our zenith), population will have even improved production. Although so produce, how small comparatively is the cost orse labour, and other expenses?

;h I have quoted Tiptree as an instance, I ıe many farms and many estates equally or r farmed, and where the tenant's capital is to £30 per acre. Norfolk and Lincolnshire me the butchers and bakers for the metro- heir enormous purchases of stock food im- the farm and not grown there; and by the ıtity of resulting manure and corn. Security valuation for improvements, and a freedom have there attracted a fixed and ample

'TREE HALL FARM BALANCE SHEET.

rice of Wheat ıer qr.	Net surplus for Landlord and Tenant.
40s. 2d.	£543 7 4
46s. 6d.	573 11 6
61s. 7¼d.	773 5 10

Profit on Tenant's Capital at Tiptree Farm.		Per acre.
£238	= 11 per cent.	£1 19 5
268	= 10¾ ,,	1 16 7
463	= 18 ,,	3 1 2

ırashed and sold most of my wheat I am calculate safely that the profit on tenant's 1868 will be quite equal to, perhaps more of 1867. The average price of wheat for ›robably be above 60s.

PORTIONMENT OF FARM CAPITAL.

	1866.	1867.
....	£6 0 0	£6 10 0
....	1 0 0	1 0 0
:c.	2 10 0	3 10 0
s & machinery	2 10 0	2 10 0
&c., unsold...	3 0 0	3 5 6
ıpital per acre	£15 0 0	£16 15 6

:AUSES OF NON-DEVELOPMENT.

a painful subject, but we must deal with y and fearlessly. Agriculture is not on commercial or business principles. ; looked upon as a business by our land- eir agents, and tenants, the practice in ing, and holding will be more assimilated to the customs of our towns and cities. Landowners in the country seem indisposed to part with the control of their land for a period, while in a town they cheerfully grant a 99 years' building lease, or a 21 years' lease of premises. Here the tenant has not only undisputed possession, but, if he effects improvements, has also the right of selling his lease and his improvements to proper persons, without interference by the landlord or his agents; here there is no ground game or annoying gamekeeper. See what consequences flow from this sense of security and freedom of action. Men of spirit and capital pull down old houses, and raise upon their ruins business or manufacturing palaces. Under such circumstances our good old city of London is being rebuilt. Everything progresses and improves—property is constantly and rapidly increasing in value, ultimately much to the benefit of the original or ground landlord. All this results from security of tenure and freedom of action; and where these principles are carried out in agriculture, depend upon it, similar results will take place—it must be so, as a natural consequence; and I am delighted to be able to say that I know of great and improving estates where the tenants are secured by leases, with the addition of a valuation for unexhausted improvements, and political freedom, and in some cases the right of sporting.

I will give an instance of what is doing very generally in our good old city of London, where land has advanced in some cases to £2,000,000 per acre (some £60 or £70 per square foot). Not long ago I purchased of a friend, for a bank with which I was connected, an old, tumble-down house, not far from the Royal Exchange, that used to be let for £160 per annum. The new conditions were, a lease for 80 years, at a ground rent of £500 per annum—the tenant to build a house at a cost of £3000. Well, we erected one that cost £6000. In 18 months it became necessary to close our bank (having first paid every depositor in full without delay). The lease was sold for £10,300, and we realized an increase of more than £4000 on our expenditure.

So it has been in many other cases, and so it would be in degree in agriculture, if men of capital and security of tenure, freedom of action, power to sell or transfer their leases, and thus derive the proper advantages of their improvements; we should then no longer witness that wretched unalterability, which is too often the present characteristic of British agriculture—the antiquated gable-ended tenements, called farm-houses, with their projecting beams and ceilings a few inches above one's head, the old crooked Adam-and-Eve fences, and the antiquarianism of the whole concern, which indicate a primitive, unaltered, and unbusiness-like condition of things, unworthy of the rapidly increasing intelligence, wealth, enterprize, and population of this great commercial, manufacturing, and bread-and-beef consuming country.

I recently read a paper before the Midland Counties Farmers' Club at Birmingham, where I met the most wealthy, intelligent, and enterprizing farmers of an extensive district. In the discussion that followed it was painful to me to hear from every speaker that the want of security of tenure and valuation for improvements sat upon them like a heavy cloud, and prevented them from investing increased capital in what they admitted to be necessary amendments. To my surprise, they were cramped and restricted in action by the knowledge that they might be turned out of their holdings at a six months' notice! I could hardly believe that I was in the commercial atmosphere of Birmingham! Would any man in Birmingham or London make an improvement on his premises under such circumstances!

It may be true, and is, in fact, true, that on many noble estates tenants are seldom changed, but they may be at any moment, by death, by temper, by game, or by politics. I have seen enough of this to know that the tenant always feels insecure, and that this fear operates as a bar or impediment to agricultural development. It is particularly annoying and repulsive to a man of capital, intelligence, and independent feeling, that the game on his farm should be alienated from him, and his land appropriated and open to a stranger and strange gamekeeper for a paltry consideration of a shilling per acre. I know some noble and wise landowners who do let the shooting to their tenants, and thus attract a superior class of capitalists.

It astonishes me that we have even progressed thus far in agriculture under the present almost feudal restrictions. A man farming 500 acres, with a capital of £10,000, is entitled to a good and suitable house and farm buildings, and the right of shooting; but now I know of farms, larger than that, with a wretched old building a century or two old, and only suited to the circumstances of that remote and primitive period. The consequence is, that spirited men of capital will have nothing to do with such farms. Give them a 30, 40, or 50 years' lease (transferable), on condition of their laying out a large sum on a good new house, farm buildings, and labourers' cottages, draining, making roads, &c., and you would soon see estates in a very different and improved condition, much as you do in towns, where cabbage gardens have been changed into Belgravias and Tyburnias, and the wealth of the noble owners presently and ultimately enormously increased.

It is certainly, in my opinion, far more dignified to be the owner of an estate occupied by men of great intelligence, capital, and independence, than of one held by humble and servile dependents. Not only so, but as a question of £ *s.* *d.* there is no mistake as to which is most advantageous to the landowner and the country at large. If the same fear of parting with property for a given period had operated in our towns and cities as in our rural districts, the former would now be in a most antiquated condition. The Scotch system of 19 years' leases has improved farming and raised the rent of land in Scotland. Farmers now often buy farms and mortgage them, so that they may be secure in their tenancy, and have the full benefit of their improvements. If companies were formed for the advancement of capital on mortgage for long periods, say 20 years or more, on equitable conditions, this practice would be considerably extended. Now, the expenses of frequent transfer of the mortgages militates against the system.

Among the many obstructions to agricultural development may be mentioned the existing ownership of land by entail, and this must be extensive, seeing that one-half of England is owned by only 130 individuals, while one-half of the 19½ millions of acres of Scotland are owned by only 12 persons. The owners of the entailed properties having only a life interest in them, could do little in improving them until some recent Acts of Parliament permitted a certain charge to be made annually on the estate for improvements.

As most of our great landowners are legislators, let us hope that their well-informed and intelligent minds will still further untrammel the land, so that it may produce more abundantly food for the people and profit for themselves.

A vast proportion of the other half of the kingdom is under mortgage, which again militates greatly against agricultural progression. If public companies were formed to redeem the mortgages, purchase lands and improve them, good tenants could be readily found, willing to pay a suitable rent. Men of capital would eagerly compete for such farms, seeing that they would be secured by leases and other liberal arrangements. They would be free from political subserviency, and have the sole right of sporting which men of capital and position highly prize.

Another impediment to a development is, that farmers take too much lan in proportion to their capital, and so do landowners. £10 per acre used to be considered as ample farm capital; under modern requirements of arable farming, even £20 or £30 is not too much. I have £17, and that is not near enough. The live stock on an arable farm should never be less than £6 per acre—£10 would be better. The average farm capital of the United Kingdom is under £5 per acre. Capital alone will not ensure profitable farming. It must be accompanied by business aptitude; in fact, a knowledge of agricultural practice, and a proper carrying of it out.

GRASS LAND—PERMANENT PASTURE.

Here is the grand field to which we must look for development and progress. One half of the kingdom is in permanent pasture. The last Board of Trade returns give 22,156,541 acres in 1867 as against 21,174,797 in 1866, shewing an increase of 981,754 acres in grass land. These returns are exclusive of heath or mountain land. Our grass lands are now in the hands of Nature, they should, and I hope will, pass into

of man. We have heard too much lately
ig down lands to grass and depending on
untries for corn. Judging from the latest
hat opinion appears to have been acted upon.
gainst this mistaken practice, as most inju-
he country at large. I shall shew you by a
of facts that the grass land of this kingdom
national loss and mistake—that it is starving
e, and to advocate its extension is a cruel
ot one loaf of bread for man is produced by
one-half the land of this kingdom. What
re been our fate this year had all the kingdom
rass? In lieu of a superabundant wheat crop,
l have had a famine. The 22,000,000 of
rass lands have, this unusually dry season,
st unproductive, and caused a heavy loss to
iers and to the country at large, while our
heat crop, with its unusual breadth and
uality, is a blessing and a profit. We must,
t of the season, have dear meat, at any rate
time to come.

down to grass means starving the people
ving them of employment. It means stag-
trade and manufactures, and a throwing out
yment a very large portion of our artisan
n. Natural grass land employs little labour,
r machinery, and produces little food for the
The pastoral day has gone by; it cannot re-
he face of an overwhelming and industrial
n, demanding food and employment.
lands are coveted just because they require
ital and less skill, and therefore landowners
ys plenty of tenants for them. Landowners
n, because the buildings are few, primitive,
ostly, repairs small, drainage seldom asked
ences mean, and suited to uncapitalled tenants.
not much trouble about this sort of landown-
rming. It is in an unaltered state of nature—
ge, no progress, and very little increase of
ompared with arable land. All this is con-
he general advance of the country in wealth,
ce, aad population, and totally unworthy of
sh people.
ust infer from the increase of grass land that
ists an opinion that it does not pay to convert
rn land. The proofs, however, are all the
y, as I purpose presently to shew. In pluvial
and suitable soils, especially where irrigated,
y be some excuse found for grass lands, but
ry cereal districts permanent grass is a mis-
ationally, almost a crime. An experience of
ive years enables me to speak practically on
ter, for out of 170 acres I have only 14 acres
anent pasture as a run for my stock; and in-
robbing and starving it, I never allow any
to feed upon it without giving them cake,
c., as supplemental food. For all that, its
this dry season is at a minimum of value,
y 73 acres of wheat yield 6 qrs. of corn and 2
straw per acre, the latter available as food for stock; representing together a value of £20 per year.

But let me proceed to show you how little our grass land produces compared with our arable land, and then you will at once perceive how great is the national loss it causes.

Our 11,431,440 acres in corn crops produce, on an average, an annual sum of about £83,000,000, besides straw. What do our 22,156,541 acres of permanent pasture produce?—according to my rough or approximate estimate only about £50,000,000, or about 43s. per acre; while our 11,431,440 acres in corn produce £8 per acre, besides about £2 worth of straw. We can thus understand why the gross produce of the kingdom is only £3, 15s. per acre, and its capital between £4 and £5 per acre; and we can imagine how wretchedly robbed and starved must be the bulk of the grass land of the kingdom.

Grass lands, instead of being well fed with manure, are too often used as milch cows for the arable land. But poor, wretched, exhausted pastures not only keep every one at low water-mark, but the labourer on such lands should be of the Malthusian or Millite school, and not marry; for how can an increasing population find food or employment on a never-changing and non-improving soil and crop? It is this unfortunate fixity and stagnation that beget a bad name for our western and grass land districts, and furnish Canon Girdlestone and others with the means to attack agriculture. Grass land, looked at from every side, presents weak points, and is no longer consonant with our tripled population and the progressive spirit of the age.

To shew how little labour is employed on permanent pasture, a friend, who was steward over a large grass estate in Northamptonshire, assured me that the shepherding was only 1s. 6d. per acre, the attendance on cattle proportionate; one-third of the grass being mowed for hay would require more labour, but the average would probably be under 5s. per acre; on arable farms it would be from 20s. to 40s. per acre. On my farm it is 50s. per acre.

In confirmation of my censure of grass lands let me refer you to the late Mr John Morton's report on the condition of the Whitfield Example Farm before and after its improvement (see "Morton on Soils," p. 248):—

"*Before Improvement.*—Total acreage, 232, of which 164 were pasture, 68 arable. Tenant's capital, £726, or £3 per acre. Annual produce, £463, or £2 per acre. Labour employed, 8s. 7d. per acre; rent and taxes, 22s. per acre.

"*After Breaking-up.* — Landlord's improvements on the farm by drainage, new roads, new buildings, &c., £15 per acre, or £3500. Increased rent, £175 per annum; tenant's capital, £16 per acre; increased produce, £2904."

Mr Morton estimated the value of the whole produce of the farm in its improved condition at four times that of the produce of the farm for the last twenty-one years. Mr Morton made these remarks:—

"Houses and buildings very limited, and in a very bad state of repair. Forest-like appearance presented by pasture land. Immense number of trees crowded together in the hedgerows, injuring the pasture, destroying the fences, preventing the drainage, and shading the grass, thus making it unpalatable."

These remarks would apply now to immense tracts of land, undrained and unimproved. At vol. ix., p. 54, in the Royal Agricultural Society's *Journal*, the late Mr Woodward, a wealthy and successful farmer, whom I knew, gives an account of the advantages he derived from breaking up poor worn-out pasture land. Mr Woodward. in 1844, pared, dug, levelled, and drained 20 acres, at a cost of £7, 10s. per acre. The first year it produced 42 bushels of wheat per acre, sold for 14 guineas. The second year 50 bushels of wheat per acre, the third year 48 bushels per acre—all without manure; the fourth year, with 2½ cwt. of guano per acre, it promised to be a large crop. This poor grass land was only worth 25s. per acre before improvement. By this operation Mr Woodward was enabled, besides other advantages, to give employment to forty labourers for nearly three months in the dead of winter. At that period a great many labourers were out of employ. This was also the case hereabout when I carried out my drainage, digging, and other improvements, wages being then only 8s. per week with a considerable oversupply. I dug with forks much of my land at 2d per rod, or £1, 6s. 8d. per acre. It would cost 50 per cent. more now.

In my own case, after draining a piece of wretched pasture, I pared and burned it, and for the last twenty-four years it has yielded abundant crops of wheat, mangolds, beans, clover, &c.

"I could greatly multiply these instances of the individual and national advantages of passing from a pastoral to a mixed arable husbandry, but it is unnecessary, for it is so obvious, that none can doubt it who read Mr John C. Morton's elaborate prize essay "On Increasing our Supplies of Animal Food," vol. x., p. 341, Royal Agricultural Society's *Journal*.

CAPITAL AND DRAINAGE.

Are we, as a nation, short of the capital required for agricultural development? I can safely answer, decidedly not. It is only the inclination to so apply it that is wanting.

Our annual increase of capital or wealth is estimated at £50,000,000. Cannot a large portion of this be spared for profitable investment in the increased production of our food? If not, what becomes of it? I think I can tell you.

Almost daily, as I read the money article of the *Times*, I see announcements of projected associated companies for various undertakings both at home and abroad, and millions are at once cheerfully poured into the treasury of any foreign potentate who happens to be "short of tin," but not a word do we hear about door British agriculture. Money can be readily found for the Mont Cenis Railway, Berlin Waterworks, and a hundred other foreign schemes, but poor primitive, pastoral agriculture, with its bad roads, ill-shaped fields, wretched buildings, undrained clays and swamps, and half-manured lands, is unseen and unknown on the London Stock Exchange, or, as the late Baron Rothschild called it, the financial heart of the world.

Run your eye down the very long list of associated undertakings in any day's *Times* and you cannot fail to be struck with their number and variety, but not one line about that most important of all—the production of food for the British people. It is true, we have had recently formed two or three successful land drainage and land improvement companies, but at present they are little known or availed of, although so valuable and profitable. Their names and shares are never quoted on the Stock Exchange list, and I presume that their directors do not see any necessity for placing them on that list, but that I consider to be a great mistake, for if you want money, the city of London is the place to supply it, as all Chancellors of the Exchequer well know. I extract the following from a recent agricultural paper:—

"LANDS IMPROVEMENT COMPANY.—The 29th half-yearly general meeting of the shareholders in this company was held on Saturday in London—Mr W. Wynn, M.P., in the chair. The report of the directors stated that the new business for the half-year amounted to £116,921, the outlay by landowners £285,901, the commission and interest earned to £4501, and that, after paying and providing for all current expenses, there remained a net profit for the half-year of £1689, which, with £129 carried forward from the half-year ending 31st December 1867, made a total available balance of £1818. The reserve fund on the interest account was £1110, the general reserve fund £4471, and the preliminary expense account amounts to £4438. The directors recommend that a dividend at the rate of 6 per cent. per annum should be paid for the past half-year on the paid-up capital of the company, free of income tax, and payable forthwith; and that a bonus at the rate of 2 per cent. per annum shall also at the same time be paid for the past half-year on the paid-up capital of the company, free of income-tax, and payable forthwith. The report was adopted."

One would naturally conclude that with such a perfectly safe investment, yielding 8 per cent. per annum, there would be a rush of capital to the extent of millions, seeing that the 500,000,000 sterling in railways barely pay 4 per cent., with sadly fluctuating and depressed prices—that consols only give 3¼, and that many millions have been lost by the failures of banks and other public companies, so that the public are earnestly looking for safe investments. Witness, that money on the Stock Exchange is only worth 1 to 1½ per cent. per annum, and on first-class bills 2 per cent. per annum. But if the public are unaware of the existence of such companies, how can they invest in them? In these agricultural companies

ses can occur, for the money advanced is secured
irst charge upon the land, and yet the invest-
and transactions are puny as compared with
quirements. And as shewn by the following
t from Mr James Sanderson's able pamphlet on
ltural progress :—

rainage generally yields from 12 to 20 per cent.
ew instances I have known the total cost repaid
first crop. As a rule, drainage executed by
rs is unsuccessful, and in nine cases out of ten,
landowners contribute pipes and tenant's labours
abour and material are thrown away. Owners
ccupiers, indeed, reap equally satisfactory return,
drainage, the former getting their estates
nently improved without expending one
g of their own, the latter, by paying 7 per
nterest per annum, realizing in lieu 15 per cent.

ince the Government loan, which gave the first
se to drainage, was taken up, financial com-
have greatly facilitated the execution of drainage
. During the last ten years the Land Improve-
Company has advanced loans on drainage in
nd to about £1,500,000. Estimating that the
that sum has been advanced by all other finan-
mpanies and landlords together, the extent of
nnually drained in England, computing the cost
per acre, is only 37,500 acres. Progressing,
re, only at the present rate it will take 133
o complete the drainage of wet land. Adding
undrained area the extensive breadth of un-
l land in Scotland and Ireland the large re-
ble mountain area, the wide tract of convertible
nd moorland, and the very large area reclaim-
m the sea, and from the straightening and em-
g of rivers, we see that the undeveloped food
es of Great Britain are still vast."

d practically that all my drains laid 25 years
still perfect. In fact, deep pipe drainage
to me to be a permanent operation, provided
per outlets are kept free, and that roots of trees
permitted to enter spring drains. Mr Bailey
calculates that 20 millions of our acres still re-
aining, at a cost of £100,000,000.
mportance of keeping heavy land dry is well
ed this remarkable season, when we have
at wheat crops on farms that in a wet season
for want of drainage, have grown wretched
The floodless winter of 1867-68, and this dry
m spring and summer, rendered drains less
y, for there was no excess of moisture to be
rom the land by drains. The great and deep
or fissures effected an upward drainage by
tion. In a letter I addressed to the *Times* in
e page 464 of my book) I said :—

re are many millions of acres of exhausted
ds and poor stiff clays which now bind the
n poverty and discontent that would be rendered profitable by an investment of £20 to £36 per acre in the following improvements :—

Drainage	£7	0	0
Subsoiling or deepened cultivation	2	0	0
Removal of hedgerows, trees, and improved roads	2	0	0
Covered yards and good farm buildings ...	7	0	0
Suitable residence for a tenant with capital	5	0	0
Steam machinery for various purposes	2	10	0
Burnt clay, chalk, or lime	5	0	0
Guano, bones, or other manures	3	0	0
Sewage irrigation where practicable	3	0	0

"So here is a total of landlord's and tenant's improvements, which conjointly would result in individual and national profit. I am speaking practically on this matter, and I know that it would be a happy circumstance for the generality of clay-land farmers to have their present rents doubled, or even tripled, provided that the increased rental represented a fair interest on the sum expended on landlord's improvements."

My balance-sheets confirm the foregoing opinion.

STEAM POWER

is now so well known to be profitable, that I need hardly advert to it. Besides cultivation, it should on arable farms work mill-stones, pumps, chaff-cutters, cake-breakers, root-pulpers, thrashing and dressing machines. Much extension is required in this matter of steam. It is only as yet in its infancy. I have worked my engine for twenty years. Before fixed steam-engines can become general, special agreements with the landowner, as to removal or transfer, will be required. No arable farm of 150 acres should be without a steam-engine.

TOWN SEWAGE.

It does astonish me that landowners do not associate themselves by Act of Parliament, for the purpose of obtaining sewage, just as they do in the Fen districts for the removal of surplus or injurious water. The system has worked well for centuries; why should it not in sewage? It is of no use to carry either gas, sewage, or water to those who do not care to receive or pay for it, and no company can succeed unless in conjunction with the landowners under Acts of Parliament, the same as railways, canals, and other great undertakings. Take the case of the great metropolitan sewers, with the mountain of food and lake of liquids consumed by 3½ millions of people (agriculturally, I would compare them, weight for weight, with an equal number of sheep). Here a company has a grant of 50 years of the North London sewage (a river of sewage), and yet agriculture shews no sign of demand for that precious stream of the life-blood of the nation; so the company languishes. Something compulsory must soon be done, or the navigation of the Thames will be imperilled.

The 150 landowners who hold one-half of England, and the twelve who own half Scotland, have the matter to a great extent in their own hands, for they are mostly legislators. I calculate that at least 6,000,000 of acres are exhausted annually in producing food for the population and horses of the metropolis.

Mr Morton has just informed us that some of the sewaged land at Barking, that last year produced 40 tons of rye grass per acre (equal to 16 tons of hay), has this dry year yielded 43 tons of mangold per acre. Is not this sufficient evidence of profit? Many of our great estates will require a remodelling on a scale of arrangement suited to the modern requirements of steam cultivators, sewage irrigation, &c. It would pay well.

FARMING IS AS CERTAIN A SOURCE OF PROFIT AS ANY OTHER BUSINESS, ON AN AVERAGE OF YEARS.

On this point I speak practically. The return is slow but sure. I speak, of course, of well-managed farms—drained, free from fences and timber, and with suitable buildings—where there is capital and judgment. A clear 10 per cent. on farm capital, and a house rent-free may safely be taken as a minimum average. If farming was generally unprofitable, it would be given up; or rents would be reduced to a minimum.

LIVE STOCK.

A very important source of agricultural development is the better management of cattle. I speak practically on this matter, for I have annually quite 40 bullocks and 200 sheep, sometimes many more, and we have very rarely any loss of consequence; but before this development can take place fully, there must be a reform in our homesteads. The open farmyard must be abolished, and replaced by enclosed and covered sheds, well ventilated in the roof, and with paved floors. These operations are certainly profitable. The comminution, intervarying, and intermixing the food by means of steam power is an essential, also free access to good water, and to rock-salt in the mangers. Exposure and mismanagement of cattle inflict a loss of several millions annually on the British farmer. The turning out of cattle must, as a rule be given up, and will be gradually done away with as we break up our pastures. These are matters that I have long since tested by *£ s. d.* If an account could be taken of farm horses dying as a result of drinking cold water when they are heated, and getting gripes and inflammation from tough unprepared tares and clover, the total annual loss, added to that of cattle, would be found to be something astounding. Let us remember that 1s. per acre is over £2,000,000 per annum. Taking the whole country, very much more than this is lost annually to the farmer by disease and death in stock.

LET US IMPORT CATTLE FOOD IN LIEU OF MAN'S FOOD.

In the former case the results go to enrich our soil, in the latter they are wasted in our rivers. By a large consumption of foreign cattle food we are enabled to procure our manure at the cheapest rate, and mos effective in quality; and we can then produce mor corn and meat, at a diminished cost. If our gras lands are to be converted into arable, such a cours becomes absolutely necessary. My own experienc teaches me that this consumption of much foreign foo is the certain key to profit, by forcing maximum crops By this practice we feed the people and the land at th same time.

Our annual produce of wheat does not increase because the wheat after consumption does not retur to the soil, but goes down to the sewers; and but f enormous sums paid by farmers for guano, bones, an artificial manures, the land of England would be stil further impoverished. If we could see in one gre heap the food supply of London for one year, it woul be found to be a mountain, and its drink a great lak

The fact that our growth of wheat remains stationar or rather retrogrades, proves, what we already kno that the land of England does not receive more th one-third its proper supply of manure, or, in oth words, food-producing power.

SUMMARY AND CONCLUSION.

I think that you will agree with me, that I ha clearly proved by this paper, and by my practic experience of twenty-five years at Tiptree, that by increased investment of capital, both on the part landlord and tenant, the produce of the United Kin dom might be much more than doubled—that undeveloped power is immense, and that its bei called into action would greatly benefit the country large.

It would be irrational to expect that such a chan can take place suddenly—that both landowners a tenants would be content to diminish their holdings the level of the required capital, but it is well to d cuss such matters in public, and to prepare our mi for a great and profitable change and progre Where there is a will a way may be found, and trust, will be found good for agriculture and for country at large.

In conclusion, I fully endorse the opinion expres by that eminent Frenchman, M. Lavergne, in p. of his "Rural Economy of England:"—"An Engl farmer is capable of any effort when he feels confid that he is under a good landlord, who does not him down too strictly, and who will help him a pinch."

THE RELATION BETWEEN LANDLORD AND TENANT.

THE following paper was read by Sir G. O. Wombwell, Bart., at the recent annual meeting of the Boroughbridge Agricultural Society. We understand that Sir George was, at one period, the gayest of the gay, a dashing fast officer in the 17th Lancers, and was conspicuous in the famous charge at Balaklava. His father was then alive, residing in London, and the Newburgh estate was never seen by him for years, except for two or three days' shooting. It was overrun with game. Every one said when the young baronet came to it that he would make "ducks and drakes" of it; but he no sooner succeeded to it than he felt and acted on his responsibility as a landlord, and there is no estate in Yorkshire that has undergone such a marvellous change for the better as has the Newburgh Park estate during the last twelve or fourteen years. He has drained very extensively, enclosed open lands, built labourers' cottages, and the hares and rabbits he has swept off his estate. Such a man is entitled to be heard on the question of "Landlords and Tenants":—

In fulfilment of my promise I shall, with your leave, read a short paper on the relationship which I think ought to exist between landlord and tenant. It is a delicate subject to handle, and I am anxious not to give offence to my brother landlords or to the tenant farmers, and I must ask your kind forgiveness if my paper is not up to your expectations, as my time has been taken up so much of late. Now, gentlemen, I have no wish to boast of what I have done, or to sound my own praises too loudly. I am only going to give you a truthful statement of what I have done, and my views on various subjects connected with the question that I have been requested to write a paper upon. I have devoted, as many of you know, a great deal of my time for the last fourteen years to the improvement of my estates in the North Riding, and in endeavouring to advance the position of my tenantry. Now my first object was to make my tenants horoughly understand what I required of them, and my next care was not to allow any obstacle to intervene, which might prevent my tenants from farming well, and profitably to themselves; and by acting upon these principles, my tenants, I have reason to believe, gained confidence, for I have seen decided mprovements in their farming every year, since we became better acquainted and better understood each other. In my opinion there ought to be a most distinct understanding between landlord and tenant, with a feeling of confidence and security, and unless this exists it is impossible, I think, for things to go on smoothly and well, as they ought to do, on every estate.

GAME.

Whilst upon this subject, with your permission, I will touch upon two or three subjects connected with nearly all estates. I have before told you that I never permitted any obstacle to intervene to prevent my tenants from farming well. The chief object I meant to allude to was game. I may tell you, gentlemen, that I have seen the ill effects of game. About twelve or fourteen years ago my estate was overrun with hares and rabbits, and I saw directly, that if I wanted to get the estate into good order these animals must be swept away from the face of it, so accordingly I had them killed down. Now, in saying this, I should be very sorry to see the game-laws abolished, and this for many reasons, one reason being, that if it were not for the game and shooting many noblemen and gentlemen would never visit their estates at all, and consequently would spend their money elsewhere, instead of circulating it about in the locality in which they lived, and we all know that it is a most disastrous thing for that estate which the owner never resides on or sees from one year to another. Now, I like to have game in a reasonable quantity for the purposes of pure sport, and I do not think that a fair number of pheasants and partridges can do any harm, because it is the ground game, no doubt, that does the mischief, and therefore I am desirous of having hares and rabbits kept down within due limits. There are some of you who may, perhaps, say that it is better to farm under an absentee landlord, and have no game, than to farm under a resident landlord who has a great quantity. In this I do not agree, inasmuch as if I were a tenant farmer I would a thousand times sooner farm under the gentleman who lives amongst his tenantry, and has much game, than he who never comes near them, for there are, as you know, many little things that a tenant can get from his landlord who is resident on his estate, and this may make up for a little damage done by the game, which he would never get from the agents. I know no time when a landlord is so vulnerable as when he has had first-rate sport on his farms, and that is the time you may depend upon it for the tenant to attack him should he require a little drainage or help towards improvements. Let us look, gentlemen, in the next place, on the other side of the picture. If there was no resident landlord and no game the tenant would have to apply for any assistance he might need to the agent, who was probably a respectable old family solicitor, living 150 miles away, and whose reply would be (if he replied at all before the rent day) that he had orders from the absentee proprietor not to lay out a single shilling. I may tell you that ground game, in my opinion, is the curse of many estates in this country, and also in Scotland, and mainly the cause of half the bad farming we see in this and other counties. You must please to bear in mind that I allude only to hares and rabbits, for I feel quite sure that no tenant farmer would ever object to any quantity of partridges and pheasants, so long as his landlord kept down the ground game. I have asked my own tenants, and many large tenant farmers in this and other counties, if they objected to winged game, and one and all have told me that they do not; but, on the contrary, they like to see it, because it affords pleasure to their landlord and his friends. The fact of game being on the estate brings the landlord amongst his tenants; and on my own estate, I do not hesitate to say, that not one of my tenants would wilfully destroy a nest. How different this feeling would probably be if I allowed their crops to be eaten up. Upon some large estates that I know the land is let much under its real value in consequence of the landlords wishing to have an immense head of game. On one fine property in Nottinghamshire, the landlord, who is a great friend of mine, lets his land much under its rent value (and on his estate is some of the finest land in the kingdom) simply because he likes a great quantity of game of all kinds. The tenants of this landlord, many of whom I am acquainted with, have been, with families before them, there for generations. They are men of capital and enterprize, and to all appearance a most respectable class of tenants. It is certain that they are perfectly satisfied and that they are glad at all times to see their landlord, for they come out for a day's sport along with the shooting party. If they complained of damages by game, which they did not, nobody, I should think, would pity them. How different would this state of things be if their farms were let to them at their full value. I do not wish to offend my brother landlords, but my advice to them upon this subject is, if they desire to see their estates and their pockets improved at the same time, is not to allow their tenants to have their produce eaten up with game, but to be contented with good average sport. In such case the tenant farmer will then be glad to see his landlord enjoying his legitimate sport on his estate, and the landlord will also have the pleasure of being able to look his tenant in the face with the satisfaction of knowing that he is not letting his land and stocking it himself.

LEASES.

Now, I will touch upon another subject—namely, upon the question of security. In my opinion every tenant farmer in these days ought to ask for and have good security for the capital he invests on his farms, either in the shape of a well-framed yearly agreement, or a fourteen or a twenty-one years' lea often been asked what I think of the lease tell you my opinion respecting it, and the have had of leases on my estates. Abou ago I found myself in possession of some farm run out and exhausted state, and as the far liberty I determined to try the experiment fourteen years' leases to the in-coming ten care to ascertain the character of these capital and other matters, and I selected I thought the most suitable. Well, gentle one a twenty-one years' lease and the othe years' lease, and I am glad to say that I yet had cause to repent of the step I too occasion. These tenants have made gr ments on their farms at their own expen farming now in a way that only a man ca knows he has good security for the mone I was told by some of my friends that I a great mistake in introducing leases into the country, and that I should regret it. from regretting, I should now like to s farms I have let upon lease to them gentlemen, who are well-known good ju feel confident that both they and you wo the experiment had proved eminently Upon some large estates that I know of unknown and unasked for, so great pro confidence and good-will and relationship between landlord and tenant; and, in m not long ago a tenant of mine, for whom the greatest respect, on hearing that I ha fourteen years' lease, went to my agent an if he thought Sir George would give him a agent replied that he felt sure I would if as hearing this the tenant felt confidence a was quite enough for him, adding that h have a lease, as he was made aware that was ready to grant him one. Now this, in is the sort of feeling that ought to prev landlord and tenant. In these days, I cannot blame a farmer of capital, skill, for asking for security. He may have a lord, but that landlord is only mortal, and any time, and another king may sprin knoweth not Joseph," of quite a different gether; or the heir may be a minor, and may fall into the hands of trustees, whose well-known to you. I do not mean to s lease ought to be the rule, and, in my landlord ought to be very particular to wh with his property for a length of time. there ought to be some better security than t old agreements now in use on some estates quently tie down and hamper the tenant, him farming in a profitable manner to hi ought to be remembered that no man, in t progress and civilization, doing well on hi being anxious to remain as tenant, will be as to try to injure it.

LAND AGENTS.

ıe management of an estate a good agent is
; to most landlords, and I must say that
ınate am I in this respect. But however
agent may be, there is nothing in my
ɔinion like the master's eye taking a glance
matters are going on, and if the landlord
'thing about the management of his estate,
stinguish between good and bad farming,
ord, I am sure, will agree with me that it is
take to keep a sloven upon his estate, not
pays his rent with the greatest punctuality.
:ll that there are plenty of good tenants to
farms on estates which are well cared for
l after, tenants who will not only pay their
.rly, but farm well and improve their farms
ıemselves, for it is a well-known fact that a
loes well to his farm does well at the same
landlord and likewise himself.

AGRICULTURAL LABOURERS.

respassing too much on your attention I
a word or two about the labourer. After
ındlord and tenant are much indebted to
do think that we, as landlords and you
do not pay that attention to his social con-
ıght to do. On many large farms that have
with them the labourer's dwelling is often most
ınd sometimes dirtier than the buildings on
'armer houses his stock. Anything in some
es (I will not say all) is good enough for
r, and yet how could we get on without
ɔtwithstanding the progress which has been
ıchinery we are still obliged to employ the
If we are, therefore, indebted to him ought
devote some of our time and care to the
improvement of his condition in the scale of society. I think that it is the duty of every landlord to provide the labourers upon his estate with proper dwellings. I know as well as any man, by experience, what an unprofitable investment, in a pecuniary point of view, the building of cottages is upon an estate; but I am convinced, and I speak from a practical knowledge on the subject, that the landlord is in the end well repaid in providing good dwellings for his labourers, inasmuch as although the cost may be considerable in the first instance, as I know it is by experience myself, yet the landlord for his outlay obtains a better class of men, and his work is more efficiently done.

To conclude my paper, I may say in general terms that, in my opinion, the right feeling which ought really to exist between landlord and tenant is a confidence on the part of the tenant that he is safe on his farm and never likely to be disturbed, either by having his rent raised or his land taken from him, so long as he farms well and keeps his house, buildings, and everything belonging to the farm in good order and repair; and, on the other hand, a feeling on the part of the landlord that he has a good tenant, and that he would be sorry to lose him. Depend upon it, and I speak from experience, that when this proper feeling exists, everything will work well; the tenant will prosper as he ought to do, and make money, and the landlord will have the pleasure of seeing his estate going on improving and becoming more valuable every day. Finally, gentlemen, let me thank you for your kind attention, and allow me to express a hope that we may have many more such pleasant meetings as the present, and that you will never be able to tell me with any degree of truth that I have not acted up to the principles I have enunciated in my paper.

PRESERVING FRESH MEAT.

'ournal of Agriculture* for May 1868, there
'ed an article on Medlock & Bailey's pro-
ɛerving meat fresh. In a number of the
bserver, which has just reached us, appears
ng article, which shews that our colonial
anxiously directing their attention to this
ubject :—

s that Medlock & Bailey's patent for pre-
h meat by steeping it in bisulphate of lime
troduced into the neighbouring colony of
nd that it has been used with success in
-tried experiments. Joints of meat, in fact,
ubmitted to the process, and then, after
weeks, have been cooked and eaten, to
tisfaction of all concerned. The meat was
d of good colour," the "whole of the gravy
have been retained," and there was no
"unusual flavour" to be detected by the most critical. So far this is only confirmatory of the statements which have been republished from English newspapers. But the other part of the question—that which relates to the easy mode of preserving the meat—is more than supported by the statements which come from the neighbouring colony. The complex apparatus which is required in other processes of preserving meat is done away with altogether, and nothing is required, it is said, "beyond a gallon of the bisulphate of lime, mixed with half-a-pint of common salt and four gallons of water." In this mixture the joint is steeped for half an hour, and then hung up to dry in a cool place. Such is the whole of the process, and it appears to be so simple that any one might use it either on a large or a small scale. The plan also is cheap as well as easy, for the bisulphate may be used frequently

before it loses its preservative qualities. And then, on the score of health, there is nothing detrimental in the ingredients; but, on the contrary, they are often used for their sanitary properties.

At present the system promises to be the most successful as a mode of preserving *fresh meat;* for the cost of tins or other expensive cases is avoided, and the work of preparing the food for market seems to require but very little labour. But in saying this we cast no discredit at all on the various processes for preserving meat by *salting it.* A correspondent lately complained that in drawing attention to the claim of Medlock & Bailey's process we did an act of injustice by speaking of Morgan's process as one which "hardened" the beef. But this was not intended to signify more than the fact that all salting tended to harden meat, and that therefore, as compared with some good process for preserving it fresh, Morgan's system laboured under a necessary drawback. But, at the same time, there will always be a demand for salt meat as well as fresh, and it is very possible that to meet that demand Morgan's system will be found superior to any other.

Already some samples of meat preserved with bisulphate of lime have been sent to England from Victoria, and suggestions have been made for preparing large quantities by injecting the carcases of sheep and bullocks with the preservative fluid. But it is believed that the simpler process of soaking will answer best; and with regard to the mode of transmission, it is stated that canvas bags will answer all the purposes of casks without being so troublesome or expensive. There appears no reason, then, why a trade in this mode of preserving meat should not be started in all the colonies, or why the population of the mother-country should not at once begin to obtain good Australian beef and mutton at 3d. or 4d. per lb.

Of patent meat-preserving processes generally there is such a large number on record that those persons whose attention had only just been called to the matter might be surprised at the unlimited field which is open to their choice. A table containing some two hundred of these processes—all patented between 1691 and 1855 inclusive—has recently been published. The first patent in this long list is one taken out in 1691 for "preserving flesh, fowle, and fish;" but the nature of the process is not stated. Then there is another in 1763 for "curing salmon with spices," by "boiling with cloves, mace, pepper, salt, and vinegar;" and this is the favourite method of preserving fish to the present day. Then soon afterwards there came a patent for "placing food in vessels furnished with a valve, and then exhausting the air;" and this was the commencement of the numerous vacuum processes which generally failed from the difficulty of perfectly excluding the air. Next, in 1819, the patents are remarkable for one which gave the hint as to all the processes which are now in use for preserving provisions in tins. This patent, by E. Morrison, was for cooking animal and vegetable products in vessels which were closed air-tight during the operation. Then, in 1834, there is the commencement of the "injection processes," in a patent taken out by D. R. Long for preserving carcases by injecting "anti-putrescent" preparations into the blood vessels. This same idea, too, is embodied in a patent registered in 1855 by Alfred Tooth, when it is described as a process for curing and preserving entire animals by injecting solutions of saline substances.

As amongst other patents, too, there are some extravagances in the list of processes for preserving food. These are marked in the return as "useless and absurd," and are as follows:—Preserving fruits and vegetables by the use of a "saline vapour bath;" preserving provisions by use of "double vessel, the outer one to contain water;" preserving game by the use of "double chambers, warm air, and carbonic acid;" preserving animal and vegetable substances "by hanging in chamber with fire, on which sulphur, chloride of lime, or flowers and roots are thrown."

This last patent deserves the prize for vagueness, if for nothing else. But the most noticeable thing about the hundreds of schemes which have been put on record for preserving food is, that the same idea is frequently patented by different persons. The record of these patents, however, bears evidence to the zeal with which inventors have sought for efficient means to preserve the food of one country for consumption in another, and it is not likely that this zeal will relax now that meat is so scarce in Europe and so abundant in Australia.

REPORT OF THE AGRICULTURAL EMPLOYMENT COMMISSION.

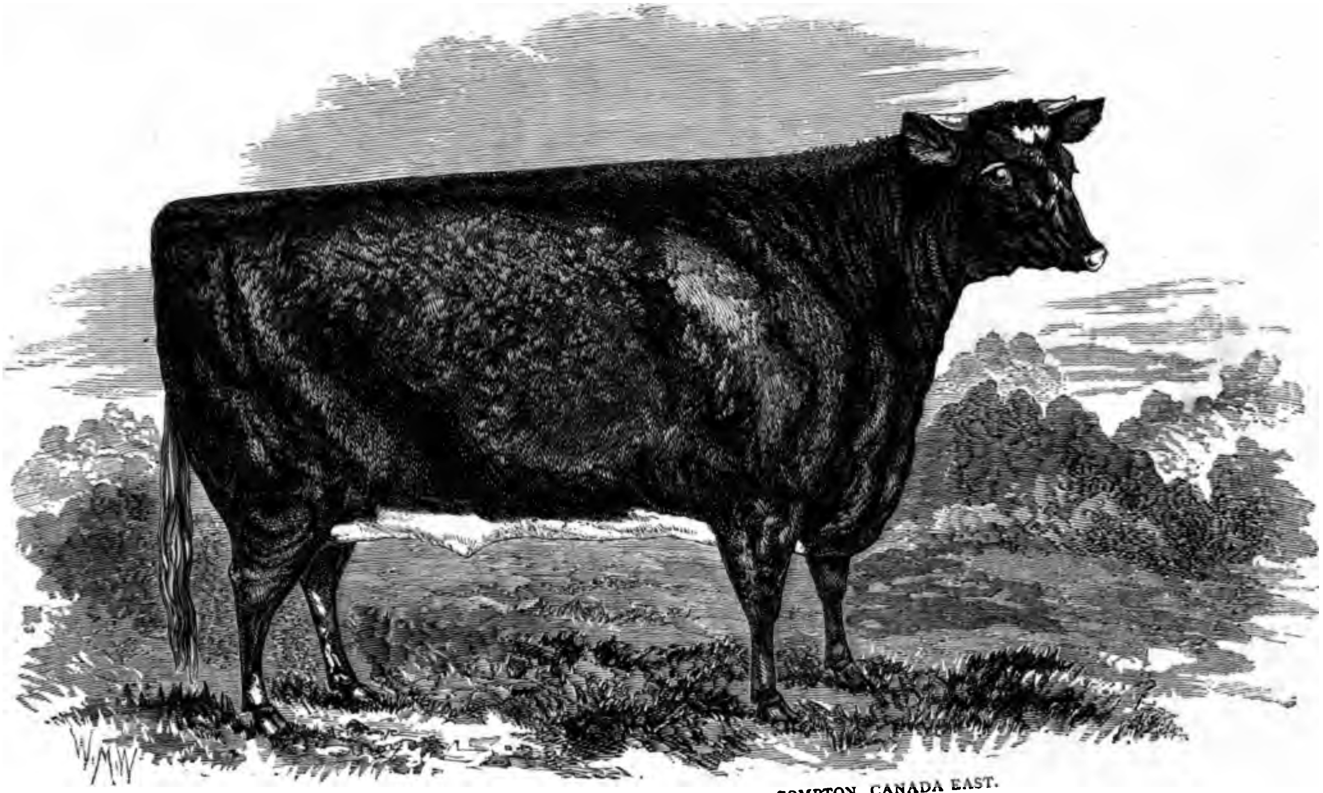
A FIRST report, says the *Times*, has just been issued by the Commission appointed in 1867 to inquire into the employment of "children, young persons, and women," in agriculture. The inquiry was prompted by the recent disclosures respecting public gangs in the eastern counties, and by the increasing complaints of the want of education in country districts. The Commissioners enumerate four principal subjects for their investigation—whether the labour of young children and women was so excessive as that which had been found to exist in factories and workshops, and which justified the interposition of the Legislature; whether the employment of women in agriculture had an injurious effect upon their morals or

domestic education; what limitations should
d in regard to the age at which children
employed in farm labour; and what amount
attendance might be enforced. The first
ntains the result of inquiries made in the
nties, in Northumberland and Durham, in
, Nottinghamshire, Leicestershire, North-
re, Huntingdonshire, Bedfordshire, and
mshire, and in two southern counties, Sussex
estershire. The result is a mass of multi-
formation on the circumstances of agricul-
s found to exist in these counties. The aid
le Assistant-Commissioners was obtained,
detailed reports furnish interesting descrip-
m personal observation, of the varying
f agricultural labour in different districts.
t of varied experience is brought together,
art from other considerations, must have a
t value for all who are interested in improv-
ndition of the labourer. Difficulties which
superable in one district are successfully
another; and, whatever the direct result of
, it proves, we think, that the general condi-
labourer is capable of vast improvement by
nagement.

lue of such information lies to a great extent
ils, but, on the whole, the result is more
y than would, perhaps, have been antici-
he Commissioners do not bring to light any
buses than were already recognized, nor do
ure to recommend any prompt or vigorous
ion. The employment, for instance, of
at early ages is frequent in all parts of the
xcept in the north; but it does not appear
health or growth is injuriously affected.
parts we read of their going out to work at
even six years of age. They earn a few
day by scaring birds or picking stones, or
ally simple task, which, in fact, only keeps
the open air, and gives them something
think about instead of being idle. We
ad of any attempt being made to put them
work before the age of twelve, when
begin to learn to drive the plough; nor are
where regularly employed before the age of
eir early employment, in fact, seems to have
disadvantage—that it deprives them of a
ry education; but this is obviously very dif-
m the case of factory children, whose health
anently injured by their unwholesome work.
, again, a remarkable conflict of evidence
g the labour of women. The general feeling
be that both their morals and their health are
y it. A great deal, however, depends upon
at which women work, and the circumstances
employment. Some, for instance, think they
allowed to work when mere children, and
en they have reached maturity; others would
eir work to be continued till maturity, and
en prohibit it. But the experience of North
Northumberland presents a remarkably different picture. This county is described as almost the paradise of agricultural labourers, and here the women are generally employed on the farm until they are married, but not afterwards. They turn their hands to every description of work, the driving of horses, the filling of carts, the forking and loading hay and corn—work, in fact, which in the south is generally condemned as unsuitable to women. Yet the opinion of the Assistant-Commissioner is that "it does them no harm, either physically or morally." When they marry, they stay at home and give all their attention to their families; they become active and economical mothers; their daughters, as they grow up, go out to work, leaving their mother free to take charge of the household; and the young children are diligently sent to school until they are eleven or twelve years of age. When the labour of an important county is organized on this system, with no injurious results either to physical or moral health, it would evidently be very difficult, even if it were desirable, to enact any general prohibitions against female labour. The fact, indeed, which is most prominent in the report is the great variety of circumstances with which we have to deal. On light soils, or with root crops, children can be employed with impunity at a much earlier age than in districts where heavier labour would be exacted from them. There seems, however, one generalization which might be made with some security. It is probable that no inconveniences would be caused if children were prohibited from working before the age of ten; and between the ages of ten and thirteen they are idle for such a considerable portion of the year that a certain number of hours' schooling in the twelve months might be readily exacted from them.

But the Commissioners are unable to come to even this conclusion without qualification. There are many districts, many cases and classes of cases, in which the parents are really unable to spare the money which the labour of young children adds to their weekly earnings. It is calculated, for example, that "the minimum loss to a labourer by the exclusion of his children from farm labour up to the age of ten may be taken at £2, 10s. a year;" and when the whole earnings of the father do not amount to 15s. a-week, or less than £40 a-year, such a loss is a very serious sacrifice. Supposing a restriction to be continued upon the labour of children up to the age of thirteen, for four months in the year, the loss to a family might amount to as much as £7 a year. It is obvious that, in proportion to a man's wages, this would be an expenditure upon the education of his children which it would be most unreasonable to demand. The Commissioners therefore, appear convinced that no such pressure can be brought to bear on the agricultural poor until their general earnings are materially augmented. Wherever they are well off, as in Northumberland and Durham, there is no difficulty in inducing them to send their children to school; on the contrary, they display great anxiety for a good education. The question of education, accordingly, becomes simply a question of money, and the first point which demands attention is the possibility of raising the general condition of the labourer. Is there any ground for believing that this could be accomplished? There can be little doubt of it, according to the results of this inquiry. We have already referred to the fortunate condition of the labourer in Northumberland. A most remarkable comparison is instituted in the report between the cost of labour in Northumberland and in Bedfordshire and Buckinghamshire. In those two midland counties the cost of labour is upwards of 7s. per acre greater than in the north, while at the same time the labourer is infinitely worse off. The explanation is simple. The Northumbrian hind is well paid and well nourished; he is consequently mentally and physically superior to the southern labourer, and is able to do more work. The farmer, therefore, needs fewer labourers, and the landlord fewer cottages. For instance, on a farm of 400 acres in Bedfordshire the "income arising from employment in agriculture amounts to £603, to be divided among fourteen families, giving about £43 to each;" whereas on a similar farm in Northumberland "the income amounts to £483, to be divided among eight families, giving £60 to each." It is evident from such comparison that landlord, farmer, and labourer might equally be benefited by reducing the amount and increasing the quality of labour, and by dispersing the surplus population among other employments.

But a large portion of the report is occupied with the discussion of another means by which, in the opinion of the Commissioners, we might materially contribute towards the same result. They collect a great deal of evidence to shew the benefit which a labourer derives from a small garden or a moderate allotment. It adds greatly to his pecuniary resources, and its moral advantages are even more important. It is more effectual than any club to keep him from the public-house, and it encourages habits of industry and economy. The subject seems to have attracted attention from the middle of the last century, and to have been continually kept before the public mind until about the year 1845, when Mr Cowper introduced a bill into the House of Commons, "to promote the letting of field gardens to the labouring poor." It passed the Commons, but was dropped in the House of Lords, and since then the question seems to have been neglected. The Commissioners illustrate their remarks by some interesting information respecting the connexion of the poor with the land in former days. They represent that in old times the poor had most extensive common rights over waste lands, and that with the progress of enclosures they have gradually lost these rights without receiving any equivalent. The owners, not the poor, have been compensated. They seem to think it would be both possible and desirable for every poor man to be "attached to the land," through the occupation of a quarter of an acre or more, and they suggest that the Legislature might interfere to facilitate such a result. We cannot at present inquire whether such a suggestion be practicable, but there can be little doubt the Commissioners have pointed to the real source of our difficulty in extending education in agricultural districts. Food, after all, is more essential even than reading and writing, and until the condition of our agricultural labourers is improved, it is neither possible nor reasonable to exact the sacrifice of their children's earnings. If the solution of the problem be delayed by this conclusion, it may be rendered at the same time more complete and permanent. The second and final report of the Commissioners will be published in the course of the next session, and we shall then probably have before us all the information necessary in order to decide on the best course to pursue.



DUCHESS 97TH, THE PROPERTY OF M. H. COCHRANE, ESQ., COMPTON, CANADA EAST.

Portraits of Domesticated Cattle.

No. 3.—*DUCHESS* 97*th.*

resent our readers with a portrait of
e shorthorn heifer Duchess 97th, that
y Captain Gunter in August 1868 to
Cochrane of Compton, Canada East,
m of 1000 guineas, the highest price
yet been given for any cow or heifer
eed. The annexed is the pedigree as
o Mr Cochrane :—
s 97th, red, calved March 27, 1867;
Captain Gunter, Wetherby Grange,
, got by Third Duke of Wharfdale
- Duchess 92nd by Fourth Duke of
1387), — Duchess 84th by Archduke
- Duchess 72nd by Fourth Duke of
387), — Duchess 67th by Usurer (9763),
ss 59th by Second Duke of Oxford
(Duchess 56th) by Second Duke of
erland (3646), — (Duchess 51st) by
Lad (3407), — (Duchess 41st) by
(1706), — (Duchess 32nd) by Second
(1423), — (Duchess 19th) by Second
(1423), — (Duchess 12th) by The
), — (Duchess 4th) by Ketton 2nd
Duchess 1st) by Comet (155), — by
(252), — by Daisy Bull (186), — by
(252), — by Hubback (319), — by J.
ld Red Bull (97).
the first Duchess that Captain Gunter
ince the herd was established in 1853.
he has on two or three occasions been
000 guineas for a female of the tribe,
sed to sell, and Duchess 97th was sold
ition that she was exported never to
his Duchess tribe is undoubtedly one
hest of the shorthorn breed, and cer-
most fashionable family. Bulls from
en repeatedly sold for 500 guineas as
l there is still a great demand for the
ver the country.
hrane, when he offered 1000 guineas,
ed to have the choice of four yearling
d public opinion admitted that he
he best. In colour this young heifer
blood red with a white star on the
nd white along the belly, markings very
those of Duchess 1st, that was calved just sixty years ago. The head is beautiful, horns well placed, and inclining slightly outwards; neck thin, like milking; shoulders well laid, chine and dewlap excellent; the ribs and loin are magnificent, the former being nicely arched, the latter thick and good, and carried well over to the hip bone. The hind-quarters are a little narrow, but the breadth of the loin makes it appear worse; the hair is fine and long; the quality of flesh mellow to the touch, with a fair thickness of skin. But beyond all these points there is that smartness and style which characterise every member of the family.

The history of the Duchess tribe is generally known to shorthorn breeders. Charles Colling bought a cow by J. Brown's red bull, from the Duke of Northumberland's agent in 1784, the tribe having been on the estate for two hundred years. In 1799 he shewed a three-year-old heifer, from a Duchess cow and by Favourite (252), in Darlington market. Mr Bates saw this heifer and thought her superior to the famous Durham ox. When killed, he said "she was the completest carcase I ever saw, and weighed, at three years old, above a 100 stone of 14 lb., or 17½ score per quarter. Her excellence determined me to possess the breed, and in 1804 I bought the grand dam of Duchess 1st."

At Charles Colling's sale in 1810 Mr Bates bought Duchess 1st for 183 guineas. Until 1850 the family was solely in his possession, and became famous for its superiority to all his other tribes. Duchess 34th bred Duke of Northumberland (1940), winner of the first prize at the Royal meeting at Oxford in 1839, and said to be the finest bull ever seen. Mr Cottrell, a noted breeder, writing in 1830, said, "the Duchesses were well ribbed up and with better shoulders;" and in 1833 he writes again, saying, "the decendants fell off. I fancied a defect in handling hind quarters and milk." This judgment was probably correct, for Mr Bates introduced the cross of Belvedere (1706) of the Princess blood about 1831.

At Mr Bates' death the herd was sold, and Earl Ducie bought Duchess 59th, for 200 gs.

In 1853 Capt. Gunter bought Duchess 67th for 350 gs. This cow was by Earl Spencer's bull, Usurer (9763), which had been sold in 1848 to Earl Ducie, for 400 gs. Since then the tribe has well sustained its good name. An attempt, and a most brilliant one, was made in the show-yards with Duchess 77th, and the twin Duchess heifers. They received the highest honours in nearly every case, and Duchess 77th was considered the most noted cow of her day. Now the cattle are never shewn, but are quietly breeding and grazing on the banks of the Wharfe. The heifer Duchess 97th arrived safely at Montreal early in September. At the great Canadian Agricultural Show much disappointment arose because she was not exhibited. Mr Cochrane, however, allowed all those to see her who wished, but did not risk the life of so valuable an animal. About a dozen shorthorns and other stock accompanied her across the Atlantic, and the great gold medal was awarded to Mr Cochrane as the largest importer of thoroughbred stock into the colony.

The Farm.

ON SOME POINTS CONNECTED WITH THE SCIENCE OF CATTLE FEEDING.

N all sides the present is admitted to
have been quite an exceptional season.
long-continued drought, accompanied
a high temperature, which is rarely
lot of this country, while adding to the
e of the wheat crop, has placed many dis-
s in a position markedly precarious in
e crops upon which our farmers depend
he feeding of their stock. Important at
imes, doubly so now, are all those condi-
s which bear upon their economical feed-
and as in some degree supplementary to
articles which have lately or are at present
aring in the pages of this journal on
e foods and feeding, we deem it likely
e of service to our readers if we give
w notes under the heading as above.
se notes will not only glance at the
ing features of the relation of chemistry,
also upon that of physiology to the
tice of cattle feeding. The two to-
er present, perhaps, the most fascinating
of inquiry which can be presented to
griculturist, interested alike in the science
the practice of his calling.

he application of chemistry to agricul-
practice is no new thing—not quite so
at least, as some men claim it to be.
ntury has very nearly passed over since
ists proposed to bring the aid of their
ce to help forward the progress of farm-
But we find that what these early
ers proposed to do was vague, and un-
actory because vague, and was not based
sound principles. Little, indeed, was
n as to the relation between the soil and
nstituents, and the plants which that
roduced; but if little was known, much
onjectured, and the conjectures were not seldom characterized with a looseness—and, shall we say, wildness—which are the very opposite of true scientific reasoning or deduction. Passing over many important notes which we have gathered from various sources, and which, however interesting in themselves, want of space compels us to pass over, we come down to the comparatively late period of 1840—say a quarter of a century ago—when was issued the celebrated work of Von Justus Liebig, the great German chemist. We say great, and in nothing was his greatness more shewn than in this work, the appearance of which constituted a new era in practical science—gave birth to one, indeed, which is now known as that of "Agricultural Chemistry." The appearance of this celebrated work, entitled, "Chemistry in its application to Agriculture and Physiology," was connected with a very remarkable phase in the progress of agriculture—namely, an impression—how arising it needs not now to say—which was almost universal, that agriculture was capable of very great development, and that the principles of science, applied to it, would be productive of immense advantages. In view of this general impression, it is no wonder that, to quote the words of a distinguished follower in the steps of Liebig, and a fine expounder of the science, "that the appearance of Baron Liebig's book was therefore naturally hailed with great delight. All admired the masterly way in which he traced the elements of vegetable life to their original sources, pointed out their chemical composition, and followed them through the various stages of the plants' development and maturity, until the process of decay had again reduced them to the elemen-

tary form. His main position, too, that, in order permanently to maintain the fertility of cultivated land, it was necessary to restore to it all the substances contained in the various crops exported from the farm, was as new to agriculture as it was convincing; and its application to practical agriculture seemed as simple and easy as it has since been found to be complicated and difficult.

"For the time, however, the whole secrets of the science of agriculture seemed to be laid open by the production of this master-key; nor could it well be otherwise. The accuracy of the chemical investigations which formed the basis of this work has never been questioned, and the reasoning with which the various results were united into one consistent and comprehensive scheme seemed so sound and satisfactory, that the delighted reader was led on by easy steps until he reached an elevation from which it was difficult to avoid, believing that the prospect before him included the whole past, present, and future of agriculture."

But, as we have elsewhere remarked, "the expectations raised in the minds of practical men as to the virtue of the principles of agricultural chemistry, in their application to every-day practice, were not realized, nor were they likely to be—extravagant and ill-founded as they were—and abetted as their false views were by a perfect host of writers, who, with no real knowledge of science, flooded all the country with a wide and wild variety of the most absurd theories and speculations. Men of true science saw this, and warned, but warned in vain, the agriculturists of the danger of trusting too much to what chemistry could do for agriculture. The natural result was, that a reaction set in, and from the extreme of expecting that it would do everything they began to discredit its power, and believed that it could do nothing for them. Juster views of the matter are, however, daily gaining ground, and a correct estimate of the value of what chemical science can do for agriculture is gradually taking place amongst practical men." The details connected with what may, and is indeed justly entitled to be called the science of cattle feeding, affords a fine exemplification of the mutual dependence that exists between the various developments of animal and vegetable life, of what has been by some one called the "circle" or cycle of existence. As science tells us, and tells us truly, that the existence, and the growth, and the full development of plants depends upon the existence of certain constituents in the soil in which they grow, so, in like manner, it tells us that the existence, the growth, and full development of animals depends upon the existence of certain constituents in the food on which they live. As animals, so plants, are made up of organic and inorganic substances, or, in other words, of vegetable or combustible, and mineral or non-combustible constituents, all the chief organic or combustible of the bodies of our animals are found by the researches of chemical science to have their representatives in plants. Now, we find animal fibrin, albumen, and casein, those which make up its flesh, identical with the muscle or substances of like name found in plants, which make up what are called their nitrogenous parts. Just as the fat of animals finds its representative in some constituents of plants which make up their non-nitrogenous parts, in like manner the mineral constituents of our soil are essential to, and are found existent in our growth of plants. We find these mineral constituents have their representatives in and are greatly essential to the growth of the animal. Thus we find that while in the animal frame certain constituents are derived from the non-mineral parts of plants, we find others—as the phosphate in the bone, the alkaline earths in the flesh, and the phosphorus in the blood, the nerves and the brain —derived from and sustained by the mineral constituents of plants. As an able writer thus remarked :—"The ash of green crops is rich in alkaline carbonates and common salt; and the blood of herbivorous animals abounds in alkaline carbonates. . . . Were it possible for a plant to grow, flower, and bear seed without the co-operation of mineral matters, it would be utterly valueless to man and animals. A dog will die of hunger in presence of a dish full of raw or boiled white

lk of eggs, in which is wanting one of
stances most important for the forma-
f blood. The first trial teaches him
ch food is as inefficient as a stone for
poses of nutrition; the constituents of
es of turnips and of meadow plants give
heir nutritious value. Did they not
n them, such plants would not be
ed by horses and cows. Every-
in nature prevail those harmonious
hich attach life to the earth, and
in it in perpetual freshness and dura-

ill have been gathered from a state-
given at the commencement of
aper, the constituents of all our
re classed under one or other
divisions:—First, the "organic," or
substances which are capable, and,
the "inorganic," or substances
re incapable of being consumed, the
also being termed the "ash" or
al" constituents of food. Let us
first, and briefly, at the organic sub-
of food; and the first point which
our attention in respect to them is,
ir constituents are classed under one
of two divisions:—First, the "nitro-
" and second, the "non-nitrogenous"
ces. The "nitrogenous" are also
"flesh-forming" substances, for a
which we shall presently see. In
itrogenous substances the four ele-
f carbon, hydrogen, oxygen, and nitro-
all present, and go to form what are
egetable albumen, casein, fibrin, or
In the animal we find representa-
all these, as in the albumen of the
an egg; the casein, in the curd of
nd fibrin, in the fibrous part of blood.
e substances of plants go to make up,
artaken of by the animal, its fully
d frame, to form the blood, the
d the muscle, and to keep up the
the animal tissues, and supply their

non-nitrogenised substances of food
ements alone are present—carbon,
n, and oxygen; the fourth, nitrogen,
ways absent. These substances are gum, hectin, sugar, starch, and fat, and they also find their representatives in the constituents of the animal frame. These non-nitrogenised substances go to keep up the warmth of the animal by promoting respiration, and add to the fat of the animal. They have thus had the name given to them of "heat-givers," of "respiratory compounds," and of "carbonaceous constituents." The last name is indicative of what Dr Lankester, an able expounder of the chemistry of food, has called them—namely, the food which keeps up the animal heat. This heat is represented by a normal temperature of 90 deg. Fah. All "this warmth," as stated by Dr Lankester, "results from the burning of these substances, which produce as much heat in the body as they would if burned in an open fire out of the body. A man inhales about 3000 gallons of air in twenty-four hours in order to burn the daily amount of food-fuel, containing about 10 ounces of carbon or charcoal. The products of combustion pass out by the mouth, just as they would fly up the chimney of an open fire were the charcoal burned in it. Less food-fuel is required in hot than in cold climates. Tropical foods contain about 20 or 30 parts in the 100 of charcoal; Arctic blubber and fats, from 80 to 90. The intense cold of the Polar regions compels the inhabitants to devour larger quantities of food-fuel to keep up the heat of the body to 98 deg. Arctic travellers state that 20 lb. of blubber is not an uncommon meal for one person."

In like manner Dr Playfair compares the consumption of food in the body to the consumption of fuel in a furnace. The furnace bar, the body; the food, the fuel; the ash, the excrement; the gases, or breath expelled from the lungs, being represented by the smoke and heated air passing up the chimney.

We have now to turn our attention to the "mineral" or "non-combustible" portion of food. The constituents of the ash of plants, useful in food, are chiefly the lime and the phosphoric acid which supply the constituents of the bone—in salts of potash which help to keep up the juices; and the phosphate of soda, the blood of the mineral frame. Dr Voelcker, the distinguished professor of agricultural chemistry, and the consulting chemist of the Royal Agricultural Society of England, thus summarises the two classes of nitrogenous and non-nitrogenous substances of plants :—

Nitrogenous substances—Vegetable albumen: a substance identical in composition with the white of egg. Vegetable fibrin or gluten—A compound occurring in considerable quantity in wheat, and giving elasticity to the dough made with wheaten flour. Vegetable casein—A substance identical in composition with the curd of milk. Legumen—A peculiar vegetable principle, which derives its name from its occurrence in large quantities in peas, beans, and leguminous seeds. Non-nitrogenous compounds—All oily and fatty matters, starch, which constitute the principal part of wheaten flour, oat and barley meal, rice, Indian corn, and the dry matter of potatoes. Sugar—which abounds in mangolds, carrots, and turnips. Gum and mucilage—Constituents of every kind of food. Pectin—The jelly-like substances which is found in carrots, mangolds, turnips, and many other bulbous roots. Cellular and woody fibre—Substances which constitute chiefly the bulk of straw and hay, and occur abundantly in every other vegetable produce.

These remarks will be well supplemented by the following from the pen of the *savan* to whose name we have already alluded :—"The growth and support," says Dr Lankester, "of an animal is now easily explained. When a flesh-eater, like the tiger, lives on the flesh of another animal, it eats, in a chemical point of view, the substance of its own body, and requires only to give it a new place and form. When a child receives its mother's milk, it does the same thing, eating, in fact, its mother, and giving her flesh a new place and form in its own body. The nutriment of vegetable eaters is precisely the same. They find in vegetable fibrin, albumen, and casein, the substance of their flesh and blood, actually formed, and have only to give it a place and position in their bodies. Vegetables are the true makers of flesh; animals only arrange the flesh which they find ready formed in vegetables. The *nutritious* value of food depends upon its richness in flesh-forming matter. An adult man, in vigour, wastes five ounces of dry flesh daily, and requires the same amount of flesh-formers in his food."

What we have now given up to this point, may be taken as a very rapid *resumé* of the generally received theory of food, and the value of its constituents; and the first point which will have struck the observant reader will doubtless be the evident determination which the theory has to divide food into two great classes, each of which has—or, according to the theory, apparently has—a separate and distinct duty to perform, or a function to fulfil. Under the guidance of this theory there is a strong tendency, if not a positive command, laid upon those who hold it, to conceive of and reckon upon it as a truth that one part of the food goes to produce certain substances, the other part other substances in the body. Thus, we talk of fat-producing and flesh-producing substances as constituents of food. And yet it is certainly, to say the least of it, a very suggestive fact, that when we endeavour to decide as to the relative values of these constituents, we can come to no satisfactory conclusion thereupon. The truth seems to be, indeed, that we shall never know this relative value, and this simply because, although they are in relation to each other as feeding constituents, they are not distinct or separate from each other, rather, indeed, are they intermingled, so to speak. Nitrogenous substances, while largely maintaining the tissues and producing flesh, at the same time, also produce heat; while, on the other hand, the non-nitrogenous substances largely, if not chiefly, creating heat and producing fat, also maintain the tissues and produce flesh. Analysis, with all its strictness of detail, has not yet been able to tell us accurately what are the proximate principles of which the different varieties of animal flesh are composed. We are as yet greatly, if not altogether, in ignorance of what are the chemical principles et a mark upon one kind of flesh as dif- from another kind of flesh, or one kind of s different from another kind. And how more complicated the question becomes the different kinds of food we give our ls are brought into play in connexion he living organisms which, with all their ing peculiarities, set all chemical ana- at defiance. We see, therefore, that it the alone thing essential to know the led constituents of food, and their t or percentage present in it. These be well defined, and most accurately ained, but they give no guide, at least no guide, as to the part they will perform animal economy, and the value as food they will yield when so brought into con- th life. The animals we feed are not as the es of steam-engines, in the which, if we me so much coal, we know that we will much steam, not as alembics, into the we put certain substances, and under processes obtain certain results. Not y are organisms, each with its own par- idiosyncracy, its likes and its dislikes, l acting upon the food substances, and pon it, the action and re-action bringing existence certain circumstances which modify their value as food, no matter gid may have been the chemical estimate value. We have spoken above of the nd dislikes of animals. Not eminently ific in their aspect are these two words, ey—or rather the ideas involved in — nevertheless, are of exceedingly ty importance in discussing the food on. We may be positively certain, as the chemical constituents of a food ncerned, that its value may be put at nd such a rate, and that it ought to be hing. But what if we find that it is not practice? what if we find that, give it as e to the animal, it will not thrive upon hat, further, if we find that it will not us the opportunity to know whether it or not, and this for the all-sufficient that it will not take of them all—it refuses to be fed by them? We cannot living organism isolate one portion of food which may be injurious, and prevent it from acting along with another portion which may not be injurious. Nay, how do we know that any portion of food will act injuriously? We may guess at, but do not know for certainty, what are the changes which the food-substances may undergo, modifying in a marked degree their action upon the tissues. Further, we do not know how far the tissues themselves become involved in these changes; we only know that they do. All these elements of difficulty come up, we know not how, and are still more complicated by the essential differences not only in the organisms of one animal as distinguished from another, but by the differences which take place in the same animal at different times. Knowing these things, we know how difficult it is to predicate what will be the effect or the value of a certain food, and how dangerous it is to decide that this value will be unvarying. We see such things popularly contained in the saying "that what is one man's meat is another man's poison"—and that which says, "what fattens you to-day, sickens you to-morrow," and if applicable, as applicable they are, to man, they are equally so to animals. The observant stock feeder must often have witnessed how that the food which does with one will not do with another; nay, how that the food that is relished the one day will be rejected the next, and that by the same animal. Considerations such as these are of some value; they may after all be worthless, but at all events they are so suggestive, and bear so closely upon the whole subject of cattle feeding that it is worth while to ascertain whether they are so or not. Of one thing we are sure, and that is, that all the varied and ever-varying phases of the science are not to be made known, or if known, not to be decided by the dicta of chemistry alone. It is not with substances *alone* that the cattle feeder has to do; he has, in conjunction with them, other materials and circumstances of a higher order, the points of which he must not overlook. The subject is by no means exhausted; we shall return to its further consideration shortly.

THE REARING AND FATTENING OF STOCK.

As the feeding of live stock is at present a subject of more than usual interest, from the circumstances in which farmers are placed with reference to supplies of food, we consider that the reproduction of the following valuable lecture, delivered some time ago by Professor Voelcker at a meeting of the Maidstone Club, will prove useful to our readers :—

Professor Voelcker remarked that the present price of corn of every description, the failure of the turnip crop, and the high price of meat, were, no doubt, inducements with the committee of that club to select the subject of the rearing and fattening of stock. He was glad that the committee had defined the subject of the lecture so well. It had struck him that one great objection to public lectures at the present day was, that scientific men had been trained in a different school to that in which the practical farmer had been taught. To instruct practical men upon a subject in which they were very much in advance of scientific men he could not hope to do. It was decidedly not the object of scientific men to endeavour to teach those who all their lifetime had been occupied in a certain business ; but to carefully investigate facts, to sift them, and reduce them to principles, so as to become a general store of useful information to all those who might come after them.

It was, then, upon the principle of rearing, and more especially upon the principle of fattening stock that he was happy to give them some information that evening. Now, it was evident that if they wanted to make the most of the food they gave to their stock they must know something of the constituents of that food, and also of the material substances of which the bodies of animals were composed. Without taking notice of minor forms of matter, the substance of the body of an animal, as they saw it before them, mainly consisted of the flesh (or lean), the fat, and the bony structure. He did not mention water, as two-thirds of all living animals consisted of that element ; but they had principally to do with the solid substances. Now, the lean part of an animal consisted of what was termed nitrogenous matter ; while the fat was distinguished by a total absence of nitrogen, but contained a very high percentage of carbon, or heat-giving matter ; and the bony structure was chiefly composed of mineral substance. In store beasts the nitrogenous substance in 100 parts amounted to 18 per cent.; the fat to 16 ; and the mineral matter to only 5 per cent., making a total of dry substance, in round numbers, of 39 parts, the remaining 60 being water. In the fat animals nitrogenous matter receded, while the fatty substance increased, in the case of oxen, to 30 per cent.; the proportion of mineral matter, and also of water, somewhat decreasing. The same results were found in sheep, only that the fatty matter increased to a larger extent ; while in pigs the increase was even more marked, shewing the remarkable adaptation of pigs for fattening. The mode in which fat was deposited was also very different in the several kinds of animals—whereas in pigs the deposit was principally on the outside, in sheep there was more inside fat, while in oxen the fat became more intimately incorporated with the lean. They might, therefore, call the fattening of animals that process which converted lean meat into fat, with the subtraction of water, or rather the replacing of water by fat. In fact, in fat pigs there was only 43 per cent. of water ; whereas in store pigs there was as much as 61 per cent.

Now, if they intended to make the best use of the food which they gave to their animals, it was absolutely necessary that they should look a little more closely to the manner in which these primary substances were constructed or built up together—in other words, they must look to the organization of the animal itself; and here, again, they found a very remarkable difference in the several kinds of stock. Some years ago very careful experiments were made by Mr Lawes of Rothampstead, Hertfordshire, who shewed the relative proportions of what were called the offal parts to the saleable meat, taking an average of 16 oxen, 249 sheep and 59 pigs. In oxen they found that out of a 100 lb. live weight, the stomach and its contents amounted to 11½ lb., while the intestines and their contents weighed 2¾ lb. ; in sheep the proportion of the stomach and contents was only 7½ lb., while of the intestines it was 3½ lb.; and still more striking was the difference in pigs, the stomach and contents only comprising 1¾ lb., whereas the intestines formed 6¼ lb. From this they saw, that though the stomach of the pig was very small, the intestinal canal, which elaborated the food, was much longer in proportion to the other animals ; and these facts at once indicated the food that must be given to these three different classes of animals. They knew by experience that pigs required a more concentrated and more digestible food than sheep ; and again oxen required a much more bulky food than sheep. In this way they filled up the stomachs of animals and made the best use of food, which, like straw or hay, was, comparatively speaking, of little use to sheep, and of no use whatever to pigs. It was doubtful whether the woody matter of straw—or to give it its scientific name, the cellular tissue—was at all digestible by the last-mentioned animals. Taking the total offal parts together, they amounted in oxen to 38.9 parts, in sheep to 40.3, and to 16.7. With regard to the relative proportion these parts in store or fat stock, they found store sheep the total offal amounted to 45.2, heep to 40.6, and in very fat sheep to only 35.5; by fattening they reduced the offal parts very rably, and produced a greater amount of sale- eat.

e next place we would direct their attention to nposition of food. They found in this the very hief constituents as in the animal body—nitro- substances, capable of supplying the muscle or art; non-nitrogenous matters, which produced d kept up the animal heat and fed the respira- nd mineral or inorganic substances, which went the bone. No food which did not contain an riate portion of these three different classes of als was fit by itself to maintain the health and growth of an animal. Now, it of course depend- the purpose for which they wished to keep an ., and also on its age and condition, as to at proportion it should be fed with these nt constituents. Bean meal contained as as 23 or 24 per cent. of flesh-forming ; and it was a remarkable thing that atter was associated, in every description d, with bone-producing material. Hence they see the propriety of giving such food to young s just weaned. Lentils, beans, and peas, for ctical purposes, might be said to be identical in sition and to answer the same purpose. But ormed a description of food evidently not well d for the production of fat. In barley-meal, as red with beans or peas, the flesh-producing con- ts amounted scarcely to one half—in other to only 10 or 11 per cent., as against 23 or 24; was very much richer in fat-producing sub- ; and this, of course, would explain why it was n excellent food for fattening pigs. With all gress of science, and all the experiments that en made, he would defy any one to find a better or this purpose. On the other hand, if they nimals from doing actual labour on the farm, ust not give them food which contained too fattening substance, but food which went to sup- muscle, which in hard work suffered greater than any other portion of the body. Hence, orking oxen, beans and peas were particularly dapted.

them, in the next place, trace the passage of the rough the body. They had seen that food was first, for maintaining the body in its present ion; secondly, to counteract the daily waste; irdly, to cause an increase in size. A very con- le portion of the food of animals was wasted in tion; and one great purpose of the food was to p a uniform temperature of the body, or, as it rmed, the animal heat. Now, of course, it was er of considerable practical importance to ascer- w much food is required to meet the daily waste nimal, and to feed the respiration; for unless they understood these wants of the body they might go on giving animals food for ever without getting them fat. It was really not so much a question of greater or less expenditure which determined whether a feeder or fattener of stock was a successful man, as it was a question in what space of time he was enabled to do this. In this respect wonderful progress has been made during the last fifty years. Oxen and sheep, in passing from the store to the fat condition, increased about half in weight; but pigs nearly doubled their weight. According to the then prevailing practice, it took the late Duke of Bedford, in 1795, sixty-five weeks to obtain that increase in sheep, while at the present time some twenty-five or twenty-six weeks was about the average period. With that improvement, however, he (Professor Voelcker) was scarcely satisfied, for he believed that with a proper selection of food it could be done in about twenty weeks, or even in less time than that. It had been found from experiments that to produce a 100 lb. increase of meat, an ox would require to be supplied with 250 lb. of oilcake, 600 lb. of clover hay, and 3500 lb., or a ton and a-half of swedes of good quality. In this total quantity of food they had in reality only 1109 lb. of dry substance—namely 218 lb. of nitrogenous, 808 lb. of non-nitrogenous, and 83 lb. of mineral matter; the rest being water. In 100 lb. increase the dry substance consisted of 9 lb. of flesh, 58 lb. of fat, and 1.6 of mineral matter. Fully three-fourths of all the nitrogen in the food went into the manure. Thus, if they gave an animal food which, like oilcake, contained from 26 to 27 per cent., and even 29 per cent. in the case of rape cake, of nitrogenous matter, they would get a very much richer manure than if the animal were fed on Indian corn, or even barley-meal or oats. Therefore, although there was a certain waste in giving fattening animals food too rich in flesh-forming materials, this was to some extent compensated in the increased value of the manure. But they would observe that out of these 1109 lb. of dry substance in food, no less than 636 lb. were required to feed the respiration; so that it was evident if they give an animal too little food, it could do nothing beyond keeping up its own heat, and supplying the waste in respiration, while it would make but little and poor manure. They might go on feeding for ever so long a time, but would merely maintain it in its present condition and to that extent the food was wasted. Therefore, in order to make the feeding process pay, they must supply a sufficiency of food that contained a good deal of matter capable of producing fat.

In the first place, they had ready-made fat, which, as a rule, might be taken as the most fattening of all food constituents. Hence the quality of an oilcake was very much measured by the quantity of fat it contained. They knew that a very hard-pressed cake was not so fattening as one from which less oil had been extracted. It might, therefore, be useful if he mentioned some few kinds of food which contained this ready-made fat. In the first place, they had seed, which contained as much as 34 per cent. of oil or fat; but as linseed had a commercial value of its own, it was questionable whether they could profitably use linseed, as such, for the fattening of animals. In linseed cake, however, they got the same material, though as a refuse; and this refuse contained as much as from 11 to 13 per cent. of oil. In some of the foreign kinds of linseed cake the oil was much less considerable than in the better descriptions of English linseed cake, and this was, therefore, one of the reasons why the latter was often preferred. Another description of food, which was extremely rich in oil, and which had lately come into use, was the palm nut kernel. Not only did this possess excellent fattening properties, but he was told that cows fed by it produced a larger amount of milk, and that the milk was also richer in cream than that obtained from any other description of food. While speaking of the palm nut kernel he could not refrain from mentioning a circumstance connected with the use of it, as he might say it was a child of his own. He tried very hard for some time to induce agriculturists to use this peculiar kind of food; but he was unsuccessful. At the present time, however, it was highly appreciated wherever it had been tried, and the demand for it was greater than the supply. About five years ago this palm nut kernel was sent to him for analysis by a Liverpool importer. From the kernel was obtained an extremely nice oil; and on a full examination he reported favourably of it, as it contained so much as 25 per cent. of the oil. He then resolved to give it a practical test; and accordingly tried it upon the farm connected with Cirencester College. The substance was duly given out to the cowman and shepherd. Like every description of new food, it was not considered palatable by the cows and sheep, for the simple reason that they had been accustomed to the best description of oilcake. Cowmen and shepherds, too, did not generally like to take too much trouble, and so it was reported that this food was of no use. It was, therefore, consigned to the granary for nearly nine months, during which time the price of oily food rose considerably, and it became at last a complaint that the sheep nearly eat their heads off. In this extremity the shepherd and the cowman again tried the palm nut kernel; and as the sheep had been nearly starved, when the palm nut was given them they ate it readily enough, and throve upon it. After a time they came to the conclusion that the palm nut kernel was the best feeding substance that could be given to cattle; and in one season they had used as much as 30 tons of it; while their sheep had gained the prize at the Agricultural Show at Gloucester. This was rather an interesting instance of what might be done by perseverance in the first instance in trying a new article. The animals might at first turn their noses up at the food; for if they accustomed them to one particular kind of food they would not take any other very readily. But it was well to accustom them to a change.

In addition to ready-formed fat, food containing starch, sugar, and mucilage was also well calculated to fatten animals though in a far less degree. The fat-producing quality of food was measured by the amount of carbon it contained, and inasmuch as they had in fat about 2½ times the quantity of carbon which existed in starch and sugar, it, of course, would take 2½ times as much as the latter constituents to produce a given amount of fat. Still, sugar and starch were most readily converted into fat. They were very digestible, and therefore specially adapted for animals provided with a long intestinal canal, such as he had shewn the pig to possess. Barley-meal contained as much as 68 per cent. of this property, and the better descriptions of Indian corn fully as large a quantity.

But to shew what a large amount of the constituents of the food passed into manure, or was wasted in respiration, he might mention that to produce an increase of 100 lb. weight in the sheep, they would require to give the animal 250 lb. of oilcake, or its equivalent in other descriptions of food; 300 lb. of clover hay, and 4000 lb. of swedes. This would form a total of 912 lb. of dry substance, and they would have stored up in the animal 7.5 lb. of nitrogenous substance, 63.0 of fat-producing, and only 2.0 of bone-producing matters. 291 lb. passed out into the manure, and 548.5 was lost in the respiration. Turning to pigs, to produce an increase of 100 lb., it took 500 lb. of barley-meal, which yielded a total of dry substance of 420 lb. From this they gained 7.0 lb. of nitrogenous substance, 66.0 lb. of fat, and 0.8 of mineral matter in the animal. They would observe that whereas, in the case of oxen, 1109 lb. of dry substance were required to produce an increase of 100 lb. live weight, 912 lb. were required in sheep, and only 420 lb. for pigs. In barley-meal they had very little woody matter—only some three or four per cent. In clover hay, however, there was a large quantity of this matter, and which they gave to the ox in bulky food in much larger proportion than to the sheep; while again pigs required a more concentrated food than sheep.

To deviate a little from this subject, they would see that, after all, there was some amount of good sense in Banting's system. Carried to an extreme, he believed it would be calculated to do harm, but in moderation he looked upon it as a most useful protest against the vegetarian system. Man was not a vegetable-eating animal. He had only six ounces of stomach in proportion to 100 lb. of body, and therefore required a concentrated food—that was to say, food which contained a great deal of flesh-forming matter. Potatoes would make a man fat, but they could not expect to get much labour out of a man who fed on such diet alone, as there was a great deal of muscular waste to keep up. At the same time, a moderate amount of vegetable was, of course, conducive to health.

But to return. Before starch was converted into fat it had to undergo a change into sugar. Now, to produce this change, force must necessarily be expended, and for this reason he conceived that when sugar lied to the animal directly, it was perhaps pted for the rapid production of fat than lf. At any rate, he held that a moderate sugar was calculated to render many kinds uch more palatable and digestible. And it is ground that he could speak in favour of lt to cattle. He looked on malt somewhat e light as he did on condimental food. He prepared altogether to disparage such food, intained that the farmer ought to have suffi- ligence to make his own condiments. With malt, however, he was quite confident it er be given as an entire substitute for barley- was too expensive for one thing; and in the effects of malt, as compared with those of al of good quality, were not such as to actical men to use it very largely in preference tter. Animals had been fed with an equal f barley-meal and malt made from an equal f barley, but the result was certainly not in malt. Still, malt would, perhaps, come to n considerable quantities in order to make inferior character more palatable and diges- in this direction he looked forward for use- ation ; and their aim should be to find out e the uses of malt in particular cases. If, ce, they were fattening prize animals for shows, it was of great consequence that they ve them some constituent which would render amount of food supplied to them sufficiently to keep them in a healthy condition ; and to this result food which contained sugar was be very conducive. Even an excess of oil- calculated to derange the general well-being nal in this fat condition, and under these cir- es malt, or other food containing sugar, would siderable advantage. In this view he would mmend to them food known under the name or locust beans. These were extremely ntaining as much as 5¼ per cent. of sugar. ssessed very little woody fibre, not a large of flesh-forming matter, and but very little substance. They were, therefore, unfit for too young stock, but exceedingly well suited in the fatting condition. On this principle e, no doubt, used in very considerable quan- "Thorley's Food for Cattle," and other nice rtificial kinds of food, now sold at high prices, h could be made at a very much cheaper rate, gredients were bought and mixed by the farmer

Carob beans might be very usefully applied g with food which had rather a disagreeable For instance, rape-cake had a bitter taste, d not suit animals well ; and it was on account aste more than anything else that rape-cake of such high value as linseed cake. He that there was great truth in the remark that must, to some extent, be pampered in their d that food which they did not like did not do much good as other kinds which they took more readily. The pungent taste in rape-cake might, however, be overcome by mixing it with carob beans. But here, again, they met with a practical difficulty ; for if they used the beans in their natural condition, the animals would pick them out, and leave the cake behind. Under these circumstances he would recommend that they should break up the rape-cake as usual, and then put to it a sufficient quantity of water to make it into a thin soup. By boiling this up for an hour, they would get rid of the disagreeable, and as he believed also injurious, oil, which the animals did not like. Into this soup also he should recommend them to throw a certain proportion of carob beans, and let it stand for another half hour, during which time the sugar would be dispelled from the beans, and they would thus get a nice tasting mess, with which, in the case of feeding bullocks, some cut up straw might be given ; and in this way he believed a very much larger proportion of straw than was at present used might be turned to profitable account.

After then briefly recapitulating the several points of his lecture, the Professor said, had time permitted, he should have liked to have dwelt on some of the descriptions of artificial food used in this country, and especially in seasons when the high price of oilcake tempted unprincipled men to dilute it with inferior substances. At the present time, he was sorry to say, oilcake was very much mixed with a substance which, although no doubt possessing some feeding properties, had a commercial value very much lower than oilcake generally. He here alluded to bran ; and although he believed the farmer would find it well that a certain proportion of this should be mixed with his oilcake, he had very much better buy the genuine articles and mix them himself. There were other substances besides bran with which oilcake was largely adulterated ; and it would also be interesting to go into the comparative value of cotton-cake, linseed-cake, and some other descriptions of oilcake. But this would occupy more time than could be bestowed on such subjects then ; and therefore, it only remained for him to thank them for the kind attention which they had paid to his remarks.

The Chairman having made a few remarks as to the more important points dwelt upon by Professor Voelcker,

Mr KEMP said he thought it would be very useful if the Professor were to inform them of the relative value of cotton-cake and linseed-cake, considering the largely increased extent to which cotton was now cultivated in India and other parts.

Mr PUNNETT could support most strongly what Professor Voelcker had said with regard to rape-cake. For years past he had been in the habit of converting the cake into a kind of soup, and mixing it to a large extent with very finely cut straw. The whole was put into a bin, and steamed, by which means a most nutritious and pleasant food was produced. In cotton-cake one of the great disadvantages was the husk, which irritated the stomachs and produced inflammation but by turning it into soup, and steaming it in the manner he had stated, they would entirely get rid of this drawback. By this means also they could largely substitute straw for hay, and be less dependent on roots.

Mr STONHAM had understood the Professor to say that it was not desirable to give locust beans to young stock. Now, the autumn of 1859 was a very growing one, and the turnips did not ripen nicely. His lambs were taken from rape-cake and mangold wurtzel (receiving in addition half a pint of oats and half a pound of trefoil hay per day), and fed on turnips, also with the oats and hay. He soon found that there was something the matter, as the animals were taken with purging and shaking of the head; and he lost six in about as many days. He then shifted them back on to the rape and mangold wurtzel, and suffered no loss. Subsequently, they were again put on the swedes, when six more died; but on substituting about half a pound of locust beans per day for the oats and hay, all went on right with the lambs.

Mr ELVY, referring to the remarks of Mr Punnett, said that straw was a great fertilizer, and if they used all their straw in the feeding of bullocks, how would they make up their deficiency in the manure? With regard to oilcake, as a practical grazier, he could state that the more oil they pressed out of the cake the better. He affirmed positively that if they were to press the seed, so as to get out say six gallons of oil, and then repress it, so as to obtain eleven gallons, cake made from the latter refuse would be better for fattening animals than that which had been less pressed.

Professor VOELCKER, in replying to the question suggested, said that cotton-cake was a most nutritious kind of food, but it had the disadvantage to which Mr Punnett had referred, in the harshness of the husk; but if by soaking the cake, and still better by steaming it, they could counteract this evil, they would find it a very cheap and useful kind of cake. With respect to locust beans, what he meant more especially to say was, that these by themselves were not a good kind of food for young stock, but when mixed with other descriptions of food they might be very usefully given. In the case of Mr Stonham's lambs he could quite see the propriety of making the change, because the sugar in the locust beans made up for that which was imperfectly formed in the unripe turnips. With respect to oilcake, they must bear in mind that linseed oil had medicinal properties, and, of course, it would not do to give it in excessive quantities, as was often done; but if they dealt with moderate quantities, he contended that the more oil there was left in the cake the better it would be.

Mr FREEMAN said he had now had ten years' experience in feeding beasts with straw, and he thought there were gentlemen present who would testify that he had produced some good animals during that time. He was convinced that the cheapest and most profitable method was to feed their bullocks with straw; though with this he liked to have a fair proportion of roots as he thought one counteracted the effects of the other.

CATTLE DISEASE.

A MEETING of the Cheshire Chamber of Agriculture was recently held at Crewe, when the following statement respecting cattle plague was discussed in paragraphs seriatim, and on the motion of Mr Coomer, seconded by Mr Trickett, of Rope, was unanimously adopted, and the secretary instructed to get 500 copies printed, and to forward one to every Chamber of Agriculture and of Commerce in England, and to the Privy Council Office, with a copy of his paper and report of last meeting.:—

"1. The Cheshire Chamber of Agriculture desires to submit to your Chamber the following statement of facts relative to the cattle plague of 1865-6, and respectfully begs an expression of its opinion on the merits of the case here set forth.

"2. The cattle plague, according to the best authorities, was introduced into England by some imported foreign cattle in June 1865, and upon its increase in the country the Government of the day appointed a Commission to enquire into its character and report on the best treatment to effect its suppression.

"3. This Commission by a decided majority reported that it was incurable, and that immediate slaughter of all cattle affected with the plague was the only certain preventive of its increase.

"4. Owing to a strong expression of public opinion against this course the Government deferred the action recommended by its Commission, but issued stringent restrictive orders of Council on the movement of cattle, and changed the same from time to time to the great loss and bewilderment of stock-keepers. In fear of the plague, hundreds of cattle were killed by their owners, on their own premises, and their carcases sent to market because the Government orders prohibited the transit of the beasts alive; and as the markets were everywhere glutted with such beef, not more than one-third its value was realized. Considerable expense was also added to the losses of those whose cattle died of plague by the orders of Council,

bed that such cattle should be buried at
skins, six feet deep, and covered with

plague still spreading, notwithstanding
'The Cattle Diseases Prevention Act of
1866' was passed, ordering immediate
all cattle so affected, and providing for
to their owners by an assessment levied
le value in each county, to the extent of
value of cattle slaughtered.
mmediate result of stamping out the dis-
y beneficial to the nation, as the plague
ate at once and decreased so much week
t it happily died out within the year.
urse helped to stay the spread of the
ther parts of the country there can be no
conferring a decided benefit upon all
, and the public generally as consumers
er, and beef; but Cheshire was so full
ious poison of the disease, that it did not
cal benefit from compulsory slaughter,
have arisen had that course been pur-

s soon apparent that under the immense
ity was sustaining, it would be impossible
mpensation granted by the Act of Parlia-
vay it provided, and urgent appeals were
ernment, by the members for this county
o alter the mode of providing compensa-
er the levy of a national rate of one uni-
t, instead of a local county rate, which it
ould press most heavily on those counties
the greatest loss.
justice of their appeals, however, was not
ledged, although the principle of a na-
d been already applied to Ireland, where
ed by an order of the Lord Lieutenant in
d the only relief afforded by the Govern-
advance this county a loan of £270,000
ent., to be repaid, principal and interest,
nstalments, extending over thirty years,
years' payments being deferred until the
ifth, and added to the amounts due for
espectively.

"9. To meet, in a measure, the cases of those who lost cattle by the plague before the Act was passed, the local authority is empowered by the Bill to grant remission of rates in whole or in part, to any person who so suffered according to its sense of his claim thereto. More than one-half the cattle lost in Cheshire (38,516) had died or been slaughtered before this time, so that the labour involved in the discharge of this duty will be immense, and from the complications that must arise, justice cannot possibly be administered; while the rates will be increased by such remissions upon all other ratepayers in the county.

"10. The case, in short, that this Chamber desires to submit to you is this:—The plague was brought into the country by foreign cattle imported in the interests of the public. The Government did not suppress its increase by decisive action, such as its own Commission reported essential. The orders in Council, repeatedly changed, induced immense loss in Cheshire by their restrictions and prohibitions without any corresponding advantage, and the benefit of stamping out the disease was more national than local, whereas the expense is made to fall heaviest on those parts which have benefited the least and suffered most.

"11. Other counties have paid their losses out of their local resources; their losses, however, have been small, compared with that of Cheshire, in proportion to their rateable value, but whether small or great the principle is the same and the injustice equal.

"12. Under the pressure of the heavy loss sustained by Cheshire, this Chamber is urged to ask your opinion on the justice of payment for losses of cattle by plague having been made from local instead of general sources, and if you agree as to the injustice of the local payment, whether you are not of opinion that Parliament should be urged to take the subject into its consideration, and be asked to refund the sums of money to the local sources from the public purse which have been expended for national benefit, or whether you can suggest any other mode of relieving this county from a burden this Chamber considers unjust towards it and ungenerous in the kingdom to make it bear."

ROOT GROWING, FARM AGREEMENTS, AND STEAM CULTIVATION.

HATHERTON occupied the chair at the
t Cattle Show dinner of the Cannock Agri-
iety, and in course of the evening made
g remarks on root growing, farm agree-
steam cultivation :—
e met after a season such as the oldest
s could not remember, and farmers were at their wits' ends to know how they should be able to feed their cattle during the winter. Had he been in England at an earlier period he should have suggested to the managing committee whether it would not be advantageous to offer a prize for the best cultivated field of turnips of four or five acres. The judges would have inspected the competing fields, and this

would have given them an opportunity of ascertaining under what conditions the best crops were obtained in this very peculiar season and retailing their experience to that meeting. Having, in company with several experienced agriculturists, inspected the principal farms on the estate of a nobleman in another county, he had come to the conclusion that where there had been any success in the turnip crop it arose from autumn deep cultivation. He believed that the farmer in this variable climate could not afford to throw away a chance, which they certainly did if they postponed the cultivation of their ground for the turnip crop to the spring. He believed the reason was, that when they converted their ground for turnips in the autumn it was less subject to the influences of a dry atmosphere, and the winter moisture was retained at a greater depth. His lordship illustrated this by an instance afforded by his own farm, where land for turnips having been prepared in the autumn, advantage was taken of an unexpected fall of rain to sow the seed, which germinated without any failure. If the land had not been ready, a delay of a week or ten days must have taken place before it could be prepared, by which time, from the dryness of the atmosphere, the soil would have been so dry that the seed would have died instead of germinating. He thought they would agree with him that if two farmers started at equal terms, and one never threw a chance away and the other did as many people did—took the chances—the probability was that one of them would live in a state of affluence, and the other was very likely to come to a state of distress. He would say a few words on the subject of clover. He had observed that very often when his neighbour's clover failed he was better off, and he gave credit for this to his able manager, Mr Wootten. He ascribed this to his not sowing a crop of red clover twice in succession, but using a variety of sorts, including the early Well's red. At the last meeting of that Society, four years ago, the subject of farming agreements was discussed, but he did not anticipate at the time much immediate good from this discussion, but he did think that much future good would result as the old agreements fell in. But, however good or comprehensive an agreement might be, circumstances would still arise during the occupancy of a tenant, which might cause him to wish to extend his capital in a manner which was not provided for in the agreement, possibly in the improvement of his house or some portion of his land. He thought they would all agree with him that it was an unfortunate system which prevailed very much in this country, that when a tenant wished to employ his capital under these circumstances he did so without reference to his landlord, or when he did refer to him he did so very often with a mere verbal agreement come to in the course of conversation. As an illustration of this he would mention the case of a most respected tenant of his who came to him and said he wished to improve certain wild land which offended his sight if he (Lord Hatherton) would allow him. There was a case which would not have come into the agreement, because the land was not a portion of the farm. In five minutes they came to an agreement, and he believed the tenant was as much surprised by his saying, "Wait a minute; we must put this down on paper," as he (Lord Hatherton) was by the tenant saying when he was about to depart, "We understand each other, and that will do." In five minutes they had concluded a very simple written agreement, which would be as binding as a lease. He did not say that it was necessary to express every supplementary agreement—anything made after the first agreement—in legal definitions; but he did maintain that all arrangements between landlord and tenant which involved the capital of the tenant ought not to be mere matter of conversation, but ought to be reduced into writing, so that there could be no possible misunderstanding about them. In the case which he had alluded to he did not remember the terms which were written down so that with the best intentions towards that tenant he might possibly be calling upon him to do that which by the agreement he was not bound to do. He could not too strongly impress upon all the absolute necessity of reducing all agreement between landlords and tenants to writing. He was quite sure that if this were done they would not hear so often of mistrust between the landlord and the tenant. His lordship then offered a few observations on the great advantages of steam cultivation, particularly in that immediate neighbourhood, where large tracts of ground on Cannock Chase were being reduced to cultivation. After observing to what great labour and comparative inefficiency the work of ploughing up this difficult land was performed by horse-power, the ploughs appearing merely to scratch the surface, it gave him the greatest pleasure to see a steam cultivator lately purchased by Mr Stubbs, of Teddesley Coppice, forced through the ground at a considerable depth by a powerful engine. He noticed that it was just as easy to turn the cultivator, in order to free it when dogged with heather, as it was to turn a common plough. It had lately been at work on a portion of the Chase, called the Rifle Butts, than which a more difficult piece of ground for a plough could scarcely be conceived, covered as it was with stones, gravel, and very high heather; and yet the machine cultivated with facility from three to five acres a day. Certainly the work was far superior to anything that could have been done by horses. When he had seen this wonderful machine at work he could not help thinking that his own steam cultivator which had done so much service could no more compete with it than an old broken-down hack was with a fine well-bred horse. Certainly any one who saw what was being done in that district must say that the science of agriculture flourished there.

ER: ITS COMPOSITION AND USES IN VEGETABLE LIFE.

following remarks form the substance of a er read at a meeting of a local Farmer's e North of Scotland :—

per on water, and its uses to vegetation, is r the information of those of my farmer o may not be altogether acquainted with its n, nor with the great purposes it subserves nomy of vegetation. This summer we have ccular proof of the disastrous effects pro- even the partial withdrawing of this all- compound.

then, is a compound. What is its com- nd what elements go to compose it? Water ed of oxygen and hydrogen gases. To his we refer you to an experiment. If hy- s be burnt in the air, and a dry tumbler held urning pit, small globules of water will be on the glass. These globules of water are from a portion of the oxygen of the air th the hydrogen. Water consists by weight rogen to 8 of oxygen. With regard to the n of water, it is worthy of remark that its tuent elements, oxygen and hydrogen, when e state, is such deadly and dangerous sub- Hydrogen is one of the most inflammable of oxygen when pure extinguishes life. Is refore, wonderful that these two gases, when ether in the above proportion, should pro- ll-important compound—water.

ater is pure it has no taste, no smell, and At 32° Fahrenheit's thermometer it be- and at 212° it is converted into steam.

ow note some of the uses it subserves to vege- ne of these is its power of dissolving sub- The many saline substances, whether exist- lly in the soil, or added to it by the hand of rease its productiveness, are dissolved by d thus enabled to be drawn into the organs nts, there to be decomposed, and subse- be converted into the substance of the It is, therefore, the solvent whereby the ins a great part of its food, and is, therefore, y element to the plant's existence. The lets of the plant can only draw up liquid food oil, and it is to aid in the performance of that manure is applied to the land.

t not forget the benefits that come from a rain. The rain serves to moisten the leaves to fill the cells of plants, everywhere to re- tation, and it also washes the mouths or e plants so as to keep them open. It is a d striking fact that on a square inch of the common lilac there are no less than 120,000 of these pores, and we are told of an oak tree where millions of leaves have been counted.

The leaves draw in partly liquid and partly gaseous food. They supply the plant, therefore, with a portion of its food. They do more than this! We have said that water is absorbed by the roots, but only part of the water is decomposed, the larger quantity of it is inhaled by the leaves. The extent to which this takes place is very large. Hales, a chemist, found that a sunflower inhaled in twelve hours about 1 lb. 5 oz. of water. But this quantity was liable to variations, being greater in dry and less in wet weather, and diminished during the night.

We will now allude to the injurious effects of a superabundant supply of water on a soil, and the benefits resulting from thorough drainage. Some of the evils of too much water in a soil are—it keeps the soil cold, the genial heat of the sun intended to warm the earth is spent in evaporating the water, and, therefore, is greatly lost to the land. When too much water is present in the soil, that portion of the food of the plant which the soil supplies is too much diluted that either a greater quantity of fluid must be taken up by the roots, or the plant will be scantily nourished.

The removal of the extra water in a soil by the medium of drains is the primary operation to be everywhere performed before crops can be economically or remuneratively grown. Some of the advantages of draining are these: the rain water is admitted into the soil, and on its passage through atmosphere and soil absorbs a quantity of substances which supply the plant with food, we therefore easily see how the presence of rain water is of the utmost necessity to the growth of plants. We find also that all vegetable matters, farmyard manures, &c., is of greater value in a soil rendered dry by draining. These substances decompose in the presence of air, rapidly producing carbonic acid in quantity, and supplying more rapidly what the several parts of the plants requires. When land is drained the rain washes into the drains many noxious substances.

Without entering further into the subject at present, I trust sufficient has been advanced to excite a spirit of inquiry among farmers generally, not merely on the subject we have been treating, but to scientific agriculture in general, assured of this, that they will be fully rewarded for all their labour. What subject is of more importance in the present day to the farmer than a knowledge of chemistry, than a knowledge of the composition of our soils, on the subject matter on which we have to operate, and also of the manure we apply to augment its productiveness—the whole subject affording a fitting theme for reading, observation, and reflection.

Notes and Queries.

I. DOORS FOR PIGSTYES.

A CORRESPONDENT complains of the trouble he has with his pigs, from the inveterate habit they have of "rooting" and poking with their snouts, resulting amongst other things in their perpetually forcing the doors of their styes, pulling them from their hinges, &c. We have a difficulty in deciding whether our correspondent complains of this habit which the pigs have, or of the trouble which the habit gives him. If the former, it is of no use complaining, as the habit is natural, and pigs, so far as it is concerned "are to the manner born." The only way is to accept the habit, and meet the trouble which it involves, by special arrangements, to prevent it. We give, in fig. 1, a slight sketch for the door of a piggery, which no pig will be able to force. From this, it will be seen that the sides of the opening between the walls, *a a*, are provided with grooves or chases, *c c*, cut in the stone or brick, in which the door *d* slides up and down. We have shewn one door *d* as broken short off, but the lower edge is supposed to fall into the groove arch in the upper surface of a stone sill.

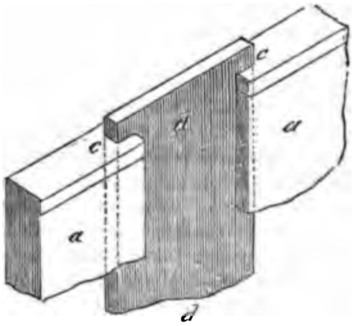


Fig. 1.

II. RAIN-WATER AND ITS VALUE FOR HOUSEHOLD PURPOSES.

On the best mode of storing it up, a remark or two will be useful here. It may appear somewhat odd to those who have not been in the habit of using it—as indeed too many are not in the habit—to say that, for all household purposes, this is the best and the purest, and the most economical alike for cooking and washing. In many parts of England, especially in the north, the rain-water cistern forms an essential part of every house; and it is not too much to say that in the economical facilities it affords for washing purposes a large amount is saved annually. For it may be taken as an axiom that the softer the water the less soap and the least labour is required in the washing of clothes; and for softness no water can surpass rain-water. This point is of very great importance, more especially to the working man, to whom it is a great point to save in every branch of household management; every means, therefore, should be adopted for receiving and storing it up. As we have elsewhere remarked, it is a notorious fact, that while the inhabitants of large and populous towns are maintaining lustily that they are wofully stinted in their supply of water, they allow gallons upon gallons of valuable soft water to go to waste, without a single effort to retain a drop, while the inhabitants of other towns, "wiser in their day and generation," use all available means in their power "to catch the descending showers." Scarcely a house in Lancashire, however low the rent, but what has a rain-water tub or cistern attached to it. Let any one who has a doubt as to the value of rain-water for washing purposes make a "calling tour" to the districts of manufacturing Lancashire, and he will return a wiser man in this respect and look upon every drop of rain-water allowed to run from off the house-tops to the drains as a "wilful waste," almost deserving of the punishment of "woful want." The amount of water collected from a roof surface of 400 square feet (20 feet by 20 will give this surface), will amount in a year to about 4800 gallons, or nearly 13½ gallons per day. It must be a very small cottage that does not give this amount of roof surface.

Cisterns for storing up rain-water are of two kinds, "under-ground," and those placed on some part of the building at a level low enough to catch all the water from the roof, and yet high enough to admit of the water being led at some pressure to the scullery or wash house. Possibly the best mode is to store the water in under-ground tanks. In figs. 2 and 3 we give vertical sections of a "tank" or under-ground cistern for rain-water, of which the following is a specification of the work to be done in connexion with it:—

"Excavate for the tank to the widths and depths required. If necessary, from meeting with a gravelly soil, form a bed over the entire surface with concrete of the depth of 9 inches, the concrete to be composed of five parts of fine gravel, screened, no stone to exceed the size of a walnut; one part of clean, sharp river sand, and one part of fresh Dorking lime, the whole ıixed, and thrown in from level of yard. When ılls are carried up 2 feet, fill in the space be- the brickwork and the soil with clay, puddled ırefully worked, as also under the paving to the ɔf the upper course of footings; this to be re- l every 2 feet up to the height shewn in section. ar concrete to that described to be thrown into aunches of the arch, to make the whole solid. e the puddle, and over the whole of the arches, filled in with dry rubbish, with a coating of dry 5 inches thick to receive the paving of the yard. ıe brickwork to be executed in the best grey stocks, l, hard, and well burnt, in mortar, composed of one ɔf grey-stone lime to two of clean sharp river sand. the walls to the requisite heights and thickness, orm skew backs for arch. Build an eye for out- ain of 4-inch socket pipes in glazed earthenware, similar eye and piping, and the necessary bends ıe inlet drain from rain-water pipes. Turn the in two rings in mortar, and build in cast-iron ·-plate and frame as shewn. Fill in the haunches concrete. (In many instances it would be desir- simply to have a man-hole, and cover with a York landing. This, of course, would be at the n of the parties superintending it.) Pave the m three courses deep, the two lower in mortar he upper in Roman cement, in the proportion of of cement to three of sharp river sand—the e of the walls and arch to be lined with an cement, well trowelled, formed of equal ɔrtions of cement and sand. Proper eyes to be in for the pipe or pipes of pump. Provide and th all stays, &c., a cast-iron pump 2½-inch pipe, copper cylinder, &c. The pump to be fitted : required in the house, and 2-inch piping of 6 ad laid therefrom to the cistern."

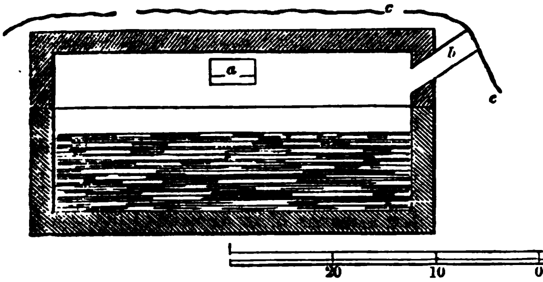


Fig. 2.

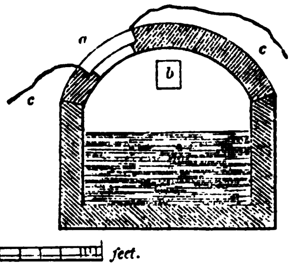


Fig. 3.

III. PUMPS.

ıpropriate enough to the subject of last note comes ɪry to hand, as to whether the method generally ɪsed of working the plunger of a pump is the ɪay of utilizing the strength of the man who works andle—to which we have to reply, that it is in reality ıost wasteful method of applying manual labour; ·asteful, indeed, the wonder is that it has for so long been permitted to be employed. By far the best way of applying manual labour to working almost any kind of machinery is that adopted in rowing. In this attitude all the muscles are brought into play, and in the way best calculated to give out the maximum of strength with the minimum of fatigue. In fig. 4 is illustrated a method of adapting this mode of giving out manual labour to the working of a pump. The arrangement is, we believe, an American invention, and it appeared some years ago in the *Artizan*. We may here note that the method is also applicable, with obvious modifications, which we may give in a future note—to the working of straw cutters and the like.

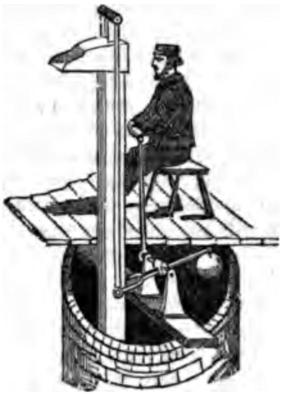


Fig. 4.

IV. PRESERVING OF BEETROOT AND MANGOLD.

We translate from a Continental journal the following upon this important subject:—We have seen that M. Leduc employs steam for the preservation of beetroot, but this method preserves it only for a certain period. We know how difficult it is to preserve beetroot beyond the month of April, and how much it loses every day, both in weight and quality, when spring makes the plant vegetate. M. Leduc was compelled to use his beetroot in six months, and fatten up an inconvenient number of cattle. Thus the preservation of this root was of great interest to M. Leduc, since it would enable him to keep it for a whole year. Well, this plan has been discovered. Having succeeded on a small scale, it has been tried on a large scale at Beaurevoir. It has been stated by a certain number of persons, that beet cut on the 6th day, and preserved in a certain manner, was kept in a state of great preservation. These beet were eaten with great eagerness by the cattle. It appears that this food would be quite as good next year. The following is the plan adopted:—The beet was cut and mixed with straw, 9 kilogrammes of beet for 1 kilogramme of straw. The whole was put in a ditch of brick work or in a square trough, and put into the ground, not too moist however. The food should be pressed very closely, in order to make it ferment equally; the ditch once full should be covered with 25 centimetres of earth. At the end of six days fermentation will have begun, and will last about ten days. During this the beet deprived of air is in a bath of steam, which gives it a piquant taste and preserves it thoroughly. M. Leduc writes the following:—"When I was persuaded that the food cut on 6th May was perfectly good and would keep a long time. I decided on making provision for the next year, but I determined on making a new experiment. This took place 1st September 1859, with 850 kilogrammes of beet cut down. The 19th October, I opened the ditch, and found the food would preserve as long as that cut the 6th May. I had made this experiment, because the beetroot cut in May had fermented in a mass, and I feared that which I cut in November would ferment too soon, and would not keep so well. This new experiment makes me work with all certainty of success."

As M. Leduc hesitates no longer, at the end of October he cut down 200,000 kilogrammes of beetroot, which, mixed with wheat straw and straw of colza, have been placed in a heap measuring nearly 12 metres long, 12 broad, and 3 deep, and containing about 430 cubic metres of food. The beetroot was heaped in this large reservoir, then covered over with 35 centimetres of earth. In five days fermentation began, the beetroot, deprived of air, was kept in a bath of alcoholic steam; by degrees fermentation ceased, and when we opened the ditch, the 7th December, there was a strong odour of alcohol. Given to the animals, they ate it with eagerness. In these conditions the fermentation of the saccharine matter of the beet began, owing to the small quantity of air in the mass, and particularly in the straw dividing it, fermentation having absorbed this air continued, and then terminated without any symptom of putrefaction. The carbonic acid in the heap must have been caused by the air. We can safely affirm that beetroot cut and fermented will afford for cattle the cheapest and most abundant food, and will be of great value to our farmers. Now, in what way does the use of beetroot present the most advantage? Should he extract the pulp, or should he use it entirely? That is a question intimately connected with the circumstances of the farmer, and he must discover which can be done with the greatest ease. But in all cases it will be an evident advantage for the small farmer, to prepare the necessary food for the cattle economically to last the year. There will be an advantage also for the farmer who wishes to fatten a number of cattle to produce a quantity of manure.

V. ARRANGEMENT OF COW-HOUSES OR BYRES.

On the arrangement of "Cow-houses," "Byres," or "Shippons," the following remarks may be given:—And first as to general dimensions:—(1) Width of stall for one cow, 5 feet; (2) Do. for two cows, 8 feet 6 inches, or 9 feet; (3) Width of manger, 2 feet; (4) Width of gedler, 1 foot; (5) Length of stall divisions or travises from wall, 6 feet; (6) Height of ditto, 3 feet; (7) Width of feeding passage, 3 feet; (8) Width of dunging passage, 6 feet.

The width of a single stall as given above, is, we are aware, deemed too great by some. The question, however, to be considered is the comfort of the animal, and if this can be secured by an additional foot or so of stall space, it should be given. Ground space is not of such a costly nature in the country as in crowded towns, as to justify the crowding together of the animals, merely to save a little extra ground or work. Besides, the main aim or end of the building is, or should be, comfort of the animals. Stalls are often, indeed we may say in new erections generally, made double, so as to hold two cows. On this point we may quote the authority of Mr Stephens—"A wide single stall is not only useful in supplying the food from the byre, but admits of the cows being more easily and conveniently milked. A double stall is objectionable for several reasons; a cow is a capricious creature, and not always friendly to her neighbour, and one of them must be bound to the stake on the same side as she is milked from, and to avoid the inconvenience the dairymaid either puts the cow aside nearer her neighbour in the same stall, which may prove unpleasant to both parties, or the cow in the adjoining nearer her neighbour, which may prove equally inconvenient. Neither is it a matter of indifference to the cow from which side she is milked, for many will not let down their milk if the milkmaid sits down to the unaccustomed side. The best plan in all respects is, for each cow to have a roomy stall to herself. The flagging or floor of the stall should be continued but a few inches beyond the heel post of the travis, the space between this and the front of the manger being of beaten earth, asphalt, or india-rubber pavement. It is essential that this part of the stall shall be soft, "because cattle in lying down and rising up first kneel upon their fore knees, which will be injured if pressed against any hard substance like stones, and which would always be the case if the causeway was not always covered with litter." The gutter, 1 foot wide, should have a smooth bottom, and have a gentle fall throughout its length. The centre space—if two ranges of stalls are required in the apart-y be flagged or asphalted, and have a slight centre. A water-trough should be supplied tall. This may be made of stone or cast- the bottom should not be level, but should n all sides to the centre, at which a plug e provided, by which the water can rawn from the trough as desired. The e should communicate with a small pipe leading to the main drain. An pipe should also be provided. A constant f water should be kept up to the troughs, authorities agreeing that it is the best and natural way to allow the animals to drink they may desire to do so. In some farm we have seen self-acting apparatus applied rough, by which the water was constantly e same level in the trough. Where water d to the steading at a pressure the troughs easily be filled by means of a flexible hose, d by a nozzle, and provided with a stop- his will be also serviceable in washing down and dunging passages, the water finding its e drains through the gratings in the channels

ETROOT SLICED AND STRAW FOR CATTLE FEEDING.

know," says a writer in the *Journal d' Agri- ratique*, "that several attempts have been fatten cattle on sliced or cut raw beetroot ith straw. M. Valler and M. Gerard t, but they apparently do not recognise the n between *raw and fermented beet*, and that has a great superiority, and is more econo- M. Leduc (as stated in a note in our last has sought to obtain fermentation chiefly on cale, being convinced it was the only way cheap and healthy food. He has made some its, and has always obtained the best results, a crop of 50 hectares of beetroot, he has fattened mber of sheep as would have required more hectares of ordinary fodder. We have fol- se experiments of M. Leduc with great in- d assisted in promulgating his discoveries. t experience has shewn the success of his t appears to us of great interest to make it nd furnish those who wish to try it with hints hem in its application.

far from advising the beetroot distilleries and ories to be shut, and beetroot employed the fattening of cattle ; but we are persuaded economical use of beetroot for the fatten- tle, such as is practised at Beaurevoir, would ry great advantages. We must always re- his truth, that sugar factories and distilleries rease indefinitely, and that if the manufac- le does not meet an extended consumption exposed to great and serious losses. The will be more easily solved for those who it from all sugar factories, and who wish to feed a great number of cattle in order to obtain more manure. It will be interesting to find—

1. That it is very easy to preserve beetroot in its ordinary condition for a whole year.

2. That it may be preserved as surely and easily as pulp, the residue of the manufacture, and ordinary fodder.

M. Leduc preserves his beet in two ways, the one by steaming for winter, the other by fermentation for summer.

VII. CENTRIFUGAL PUMPS.

Our note (No. 3) has brought out a query as to the best appliance for raising water. This will depend very much upon the quantity to be raised and the circumstances under which the work is to be done. Where the quantity is so large as to necessitate the employment of power, the best and most economical appliance is the centrifugal pump, illustrated in figs. 5 and 6.

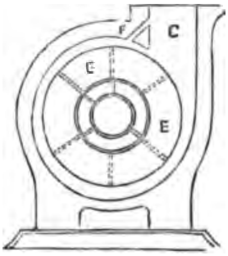


Fig. 5.

Fig. 5 is a transverse and fig. 6 a longitudinal section. As will be seen from fig. 5, this contrivance is characterised by great simplicity, thus avoiding the number of parts which are in other contrivances so liable to get out of order. The pump consists of an external case, in which a central disc, with straight projecting arms, revolves with great rapidity. A good deal of discussion has arisen as to the relative merits of the straight and curved arms. Mr Appold advocated the use of curved—Messrs Gwynne, whose form we illustrate in figs. 5 and 6, the use of straight arms. By means of the centrifugal pump a large volume of water can be raised at a very cheap rate.

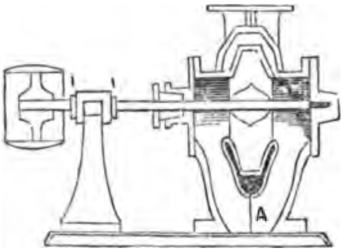


Fig. 6.

VIII. MOVEABLE FIRE-BARS FOR THE PREVENTION OF CLINKERS.

A correspondent complains of the trouble he has with his steam-engine furnace in consequence of the fire bars becoming choked up, by the formation of clinkers. To get rid of the many inconveniences of this, several contrivances have been adopted, but none seem so successful as the system of movable fire bars. A Mr Chanter was, we believe, the first to introduce, many years ago, moveable fire bars, and since then several other patents have been taken out. In fig. 7 we illustrate the general principle on which these fire bars are made. The fire bars, *c c*, are made to vibrate upon a centre, *a*, of the stud, *b*, and by means of a handle, *e*, under the control of the fireman or stoker, the levers, *d*, are worked, which give movement to the fire bars. These are so arranged that they do not move in one plane, but one rises a little above its neighbour, as shewn in the sketch, so that the fuel resting upont hem is lifted up. By the use of moveable bars not only is the formation of clinkers prevented, but a very considerable saving of fuel obtained in consequence of the necessity being done away with, of frequent "stoking and poking." Those who are acquainted with the management of a steam-engine furnace know the prolific source of waste of fuel arising from the frequent use of the coal-rake or bar under ordinary circumstances.

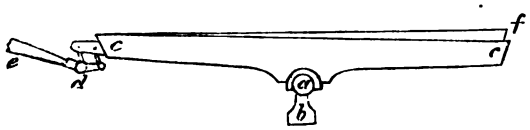


Fig. 7.

IX. MANURES.

It is not easy, rather it is very difficult to define the action, or what will be the results of any special manure upon special plants. The analysis both of the manure and the plants which it is proposed to benefit by its influence may be most rigidly made, and yet the results obtained may be altogether different from what was anticipated, and even antagonistic to what theory may have indicated. Nor need we be surprised at this, when we consider the numerous influences which come into play during the period in which the manure, the plant, and the soil are in direct relation to each other. We may apply to the manures a specific value, which analysis would certainly justify us in adopting, yet that value may be, nay undoubtedly is, changed and changing, according to all the varieties of changes in their decomposition, the peculiarities of the soil, the atmospheric effects, &c. What many of these changes are we may guess, but of many of them conjecture is not even left us, so ignorant are we of them. A writer, who has paid considerable attention to the subject, states it as his belief that only those portions of manurial matter contained in the soil, which have been sufficiently progressed by previously occupying organic life, can be assimilated or taken up by plants. Continuing this train of thought, it is also possible, some think exceedingly probable, that very remarkable changes in the condition of a manure may be brought about by coming in contact with other substances which are ready to act chemically with it. Thus, rain may act as an agent in this way by taking down, not only material substances to mix with the already deposited manure, but also gases from the atmosphere. Hence a vast variety of conflicting circumstances may come into existence, of which we have no cognizance, but which may and doubtless do exercise a remarkable influence upon the manurial body, and cause it again to exercise an influence upon the plant in the soil, or upon both combined, for which we have not in our calculations reckoned. The very fact that results are so different from what was predicated from taking into consideration that all the elements of the experiment have been precisely and accurately determined, shews that such disturbing influences come into play, only the unfortunate thing is that we do not know what they are, and consequently do not know how to provide for or prevent them. We have, therefore, much to learn in connexion with the subject, if, indeed, we are destined ever to know thoroughly about it. Some very curious and suggestive points crop up before us in considering the whole subject, to which, in another note, we may hereafter refer. Meanwhile, we would point out one to which, with great acumen, Professor Anderson has drawn attention, namely, *the rotation of manures.* We act upon the principle of a rotation of crops, but it is worth while to consider what would be gained by carrying out also a rotation or change of manures. It is to be regretted that Professor Anderson has done nothing more in connexion with this than to throw out the hint. He leaves to us, however, the hope that shortly he may take the matter up, and bring something from it of practical worth. One other suggestive question, and we conclude this note: What constitutes a proper dose or application of manure? We have, we think, pretty well established the fact that up to a certain point we may keep increasing the application with benefit, but beyond that, is it doubtful or is it certain that we, to use an Americanism, "realize a loss?"

Our Library Table.

, of the Farm and the Sea, with other
iliar Chemical Essays. By JAMES R.
HOLS, M.D. Boston (United States),
iams & Co.

FIRST NOTICE.

AN books do not always owe their origin
liberality of native publishers, or to the
of the talents of native authors. So marked,
s the opposite of this, that American literature
long time made up mainly of the products
sh pens, so ruthlessly availed of by American
's that they, as a class, furnished a synonym for
st pirates of the press. This practice still
it not to the same extent; for no longer, with
array of writers as Prescott, Motley, Irving,
ne, and other men, who must, for lack of space,
less, although not forgotten here, can it be
America has no authors, and these authors
hers, who give coin or "greenbacks" for the
e of their brains." Nevertheless, to such an
the system of "borrowing"—the term here
he meaning conveyed by the story of the
lman who "borrowed" his neighbour's cattle
quite his own—the brain-work of English
arried out by American publishers, that it is
o say in cutting up an American book whether
t be found to be one familiar to the English
or coming at all events from an English
f which, by the way, we had an example in
reviewed by us last week. The one before
wever, an exception to this, and is apparently
e production of a genuine author. Mr
is the editor of the "Boston Journal of
y," and in this capacity contributed to its
series of articles, and addressed to various
agricultural and scientific—a series of lectures
contained within our title, and of which the
been made the vehicle of presentation to the

tural chemistry has done much to aid the farmer;
those who say it might have done more. This
has probably arisen from the circumstance
e advent of the science so much was claimed
its enthusiastic partizans—partizans who had
re zeal than judgment, or indeed knowledge
ject upon which they dilated so freely, and
d so boldly. Chemists themselves, it is right
never claimed so much for the science, and
ly, because they knew what the science
what it was capable of doing for the
And it has done much for him, so much, that chemists may well look back with satisfaction upon the results of the labours of the past few years. Chemistry has taught the farmer the relation which the plant has to the soil, and of the atmosphere to both, what are the constituents of each, and how they tend in their action and re-action upon each other to give the products which are the food of man and of beast. It has taught farmers how that food is constituted, and what the offices which the respective parts perform in nourishing the frame, in making the bones, the flesh and fat which covers them, and of the blood which flows through the complete organism. Chemistry has taught the farmer many other things—the importance of alteration of the soil by deep ploughing and perfect pulverisation, of the advantage of getting rid of superfluous moisture by drainage. It has taught him the nature, constituents, and the best mode of saving and using manure, and to the list of fertilizing substances it has added largely.

There is very much that is suggestive in the work before us, as, for example, that portion of it which shews how, notwithstanding what the chemist can do, there are some things as much beyond his knowledge as they are beyond his manipulative and analytic powers. Thus, we know that we can analyse a turnip, and tell precisely what its constituents are, and the exact amount of them, but give the chemist these and ask him to produce a turnip, and he is baffled. He has the materials, but he cannot with them build up the structure; he has got the plan, but he has not the conditions. Forgetfulness of considerations such as this, or ignorance of them have led to the many erroneous estimates of the power of chemistry to which we have above alluded. And the points of the case are well put by our author, as thus: Pointing out how by the use of certain elements a manure can be obtained "very nearly as valuable as seasoned excrement. Very nearly, we have said—why is it not of equal value?" He then goes on to say—

"We have reason to believe it is owing to a minuteness of the subdivision of atoms, which we can neither produce nor comprehend, a degree of comminution which sets at defiance all mechanical and chemical manipulation. Besides this, there is, however, a peculiar condition arising from, or communicated by, the contact of vital forces, which science is incapable of explaining. A physician once brought to me a jar of ox's blood, with the request that I would extract or isolate the metal iron therefrom, and place it in his hands. In answer to an inquiry regarding its uses, he stated he wished to employ it as a therapeutic agent, under the impression that iron once assimilated would have a higher and more natural influence, when passed again through the animal economy, than the usual forms of the metal from other sources. His hypothesis was undoubtedly correct, and while it was quite within the power of chemistry to isolate the iron from the blood, it was impossible to secure it in the *condition* in which it existed in that fluid. That condition is indeed a peculiar one, and its presence is not indicated by any of the usual chemical re-agents. If we applied to it simply the usual manipulating processes, chemistry would fail to shew that there was an atom of iron present in the blood of men or animals. This may illustrate the difference between the fertilizing influence of metals and salts, as found in animal excrement, and as existing in other or the usual forms. The iron, as found in the blood, if administered to an enæmic patient, would without doubt immediately, and by direct and easy processes, again pass to its appropriate place, and restore the sanguineous fluid promptly to its normal condition.

"But chemistry can never furnish it in that form, neither can it supply the mineral constituents required by plants, precisely as found in manures; but this must not lead us to disparage science and reject its teachings. We will accept what it does teach with sincere thankfulness. We will use as a medicine the best forms of iron it suggests, and they are many and of great efficacy; we will employ those fertilizing agents which it has pointed out as possessed of merit; and they, also, are many."

There are some capital hints in the work here and there to be met with. Take this explanation of the author's mode of making superphosphate—

"Take a common sound molasses cask, divide in the middle with a saw, into one-half of this place half a barrel of *finely*-ground bone, and moisten it with two buckets of water, using a hoe in mixing. Have ready a carboy of oil of vitriol, and a stone pitcher holding one gallon. Turn out this full of the acid, and gradually add it to the bone, constantly stirring. As soon as effervescence subsides, fill it again with acid, and add as before; allow it to remain over night, and in the morning repeat the operation, adding two more gallons of acid. When the mass is quiet, add about two gallons more of water, and then gradually mix the remaining half barrel of bone, and allow it to rest. The next day it may be spread upon a floor, where it will dry speedily if the weather is warm. A barrel of good loam may be mixed with it in drying. It may be beaten fine with a mallet, or ground in a plaster mill. If several casks are used, two men can prepare a ton of excellent superphosphate, after this method, in a day's time. It affords a prompt fertilizing influence, especially upon root crops, even when employed alone. Much less acid is used in this formula than is demanded to accomplish perfect decomposition of the bones; but it is important to guard against the possibility of any free sulphuric acid in the mass.

"Another most excellent method of preparing bones for field use is to dissolve or saponify the gelatinous portion by the employment of caustic alkalies. For this purpose, take one hundred pounds, beaten into as small fragments as possible, pack them in a tight cask or box with one hundred pounds of good wood ashes. Mix with the ashes, before packing, twenty-five pounds of slacked lime, and twelve pounds of sal-soda, powdered fine. It will require about twenty gallons of water to saturate the mass, but more may be added from time to time to maintain moisture. In two or three weeks the bones will be broken down completely, and the whole may be turned out upon a floor, and mixed with two bushels of dry peat or good soil, and after drying it is fit for use.

"This mixture, embracing nearly or quite all the great essentials of plant food, is one which in its application will afford most prompt and satisfactory results. Its production cannot be too highly recommended."

Our readers may remember that, under the title of "Crops without Manure," we drew attention some time ago to the experiments and the remarkable deductions made from them by Prof. Ville of Paris. The author alludes to this, and deduces a lesson from them very frequently overlooked in farming—namely, that what will assuredly succeed in one place will not succeed in another, and this arising from neglect of the conditions of success. Thus, in pointing out Ville's theory of a "perfect manure," made up of nitrogen, phosphoric acid, lime, and potassia, he notices that magnesia is entirely omitted, and then goes on to remark—

"In countries where magnesian limestone abounds, the supply may be fully afforded by the soil. In France, Germany, and England this is probably the case; but in New England we cannot form a perfect manure and overlook the magnesian salts. In all the treatises and statements respecting fertilizing agents made by our chemists and experimenters, we find scarcely any allusions to the importance of the magnesian element; and this is indeed a matter of surprise.

"It probably arises from the practice of copying the results of European writers—not from the deductions of original and independent research. Our soils are not constituted like those of Europe, and in the application of fertilizing principles they require different treatment. A perfect manure, then, adapted to our soils, should contain nitrogen, phosphoric acid, lime, potassa, and magnesia.

"For the cereals, excess of nitrogen is demanded; for leguminous plants, as peas, beans, &c., potassa; for roots or tubers, phosphates. *All* demand lime and magnesia, and these must be supplied in the perfect food made ready for the plant-children of our fields.

"Three questions remain to be answered: First, how shall we properly prepare these elements of nutrition? Second, how shall we apply them? Third, where can we obtain them? Chemistry is fully capable of answering the first. Apply all substances to the soil in the finest state of comminution; bring everything into a condition resembling as nearly as possible the titious products of animals, which is the true . The bone for phosphoric acid must be o an impalpable powder, and this is not its ; it is better to dissolve it in acids or caustic whose teeth are sharper than burr-mills or anical levigators.

potash must be in combination with carbonic n the form of carbonate of potassa. This is easily assimilable form, but in the caustic , as in ashes, it is readily changed to carbo- ontact with air.

itrogen must be furnished through ammoniacal ds, or nitric acid salts. Lime, in form of te, hydrate, or carbonate, may be employed, sulphate of magnesia furnishes the magnesian in the cheapest, and in a sufficiently eligible How shall we apply them? This can be od wih a full knowledge of what end is had or what special want is to be supplied. There o success under the ordinary conditions in r agricultural labours are performed, unless igent system is adopted and pursued persist- m one year to another.

not necessary that farmers should be practical to be successful in the employment of fer- gencies. A few simple principles, furnished istry, if well understood and earnestly adopted, ble any one to appropriate to his benefit all rtant facts unfolded by science in respect to l application. In treating a worn-out soil, nation of all the elements needed for the three nilies of plants should be employed; and if r corn is to be cultivated, fields so prepared ld a maximum return the first year. The ear, add the proper quantity of that which they ed from the soil the first year. These will be and *phosphate of lime*. If roots have been d, the *phosphates* alone will be needed; if ember of the pod-bearing or leguminous potash. The three varieties of plants may be l in rotation, with success, when by experi- e plan is clearly understood.

e great prominent idea is, to maintain in the the elements that plants require, and in suffi- bundance. If a particular crop removes a agent, supply it. Barn-yard manure furnishes yet the same intelligence is to be employed in and the equilibrium of elements must be main- between it and crops. We know what and ch corn requires; we know how much good is capable of furnishing. A fundamental good farming is, to secure every ounce of this . It is an absurd notion, however, to suppose artificially produce it, by ill-adjusted mixtures sods, chaff, and rubbish. We can easily form and dark heap, but if the salts be absent— lmost alone give value—it is hardly worth the t costs."

the following suggestive paragraph, we close ent notice of this interesting work—

"After what has been said regarding the employment of specific fertilizers, it is probable the reader will have anticipated the recommendation I have to make, and that is, always to *compost* or *compound* elements of nutrition designed for plants, until a system is established, which will enable us to use single substances understandingly."

Geyelin's Poultry Breeding in a Commercial Point of View. Boston, 1867.

THREE hundred million of eggs are, according to the Trade Returns, imported annually into England, to which we may add another hundred million —a low enough estimate surely—derived from the hens of that happy country itself. Fancy the hens which lay these eggs collected together in one vast plain, attended by their faithful or faithless "roosters." We are reviewing or about to review an American book, and must, therefore, by no means use the synonym prevalent amongst us—the under or at least the older people—and conceive, if you can, the noise of the united cacklings and the crowing of the proud and satisfied roosters aforesaid; the scratchings, the peckings, and all the feathery fuss of the multitude, and you may form some idea of the extent and value of this branch of commerce. A branch, by the way, not by any means highly thought of by some; indeed, by them considered as altogether beneath their notice. Cattle bulk, in more senses than one, largely in the estimation of the agricultural public; horses and sheep are by no means overlooked as a source of wealth; and pigs—those Ishmaelites of the farm—come in for a fair share of farming favour; but for poultry—pooh! nothing can be made out of them, and they are carelessly or carefully consigned to the attention of the cottager, or tolerated on the farm for the sake of the gudewife, or perhaps through a somewhat decided taste for a "howtowdie" as part of a dinner, or for eggs as a not altogether despisable addition to the more solid and savoury dishes of the breakfast or supper table; and yet, in sober seriousness, it is difficult—we being poultry-fanciers the position will be conceded us—to conceive why this should be so. There is assuredly a large demand for poultry and for eggs, and which would even be larger if the supply was increased; prices are not low—if, indeed, we consider the bulk or weight which is given, high; and there is, to put the matter in the mildest way, a probability that the rearing of the hens can at least be conducted profitably, and profit is always a desirable—assuredly a pleasant—thing to have. If what political economists say be true, it must pay somebody to take all the care necessary to secure the supply for which we know there is a demand, otherwise the care would not be taken; and if somebody, why not you, my unbelieving friend, who will insist with me that "poultry cannot possibly pay?" There is certainly nothing like a broad assertion to draw attention, but one assertion in this style is just as good as another, and we can meet yours by this, "That they can pay, they do pay, and, if the business is properly conducted, must pay." We know it, for we have tried it, and a grain of fact is worth a ton of fancy. Other men have tried it also, as appears from sundry papers and letters we have perused, and as appears also from more than one statement in the book before us. If the keeping of poultry does not pay, is it because the work is not properly conducted? or is it that there is something in the case which prevents paying? We believe there is nothing; we also believe that if the work is properly conducted it will pay. On this point we give the following extract:—

"Amongst all domestic animals, the fowl is, in proportion to its cost or keep, the most profitable and useful; and hereafter I will prove by figures obtained by actual experience that poultry can be reared and sold at the rate of fourpence per pound, and leave a handsome profit. Now, such results—particularly when butchers' meat is at tenpence and one shilling per pound, and, moreover, daily rising in price on account of the increase of population and the decrease of pasturage—ought to prove a sufficient stimulant to the public at large to give a little more attention and consideration to an increased production of such valuable animal food, which, by proper management, would, within a very few years, become as much the food of the poor as it forms now a delicacy for the rich only."

Of course, much if not all of the success depends upon the mode which is adopted in breeding and rearing. This mode must embrace attention to the laws of health, which are as binding upon poultry as upon other animals of the farm. We again quote from the work before us:—

"To obtain such satisfactory results it is absolutely necessary to observe certain sanitary laws in the construction of the poultry home, and to see that the dietary scale is conformable to the confined state, and, in fact, providing poultry with an equivalent of such food as they could pick up when in a free state. The poultry home I suggest is applicable alike to amateurs and large breeders, and is intended for the accommodation of one cock and six hens for breeding, or twelve hens for laying, and twenty-four to thirty half-grown chickens; and as the same principle must be carried out, whether in small or large establishments, it follows that where it requires only one home for seven, twelve, or thirty birds, it will require one hundred homes for seven hundred, twelve hundred, or three thousand birds, and so on in proportion to the magnitude of the breeding establishment. This plan has, moreover, the advantage of keeping the races and sexes separate, of affording an easy inspection, and of extending and multiplying the homes gradually with the growth of the establishment, besides facilitating the labour in feeding and hatching, and the sanitary requirements. Another erroneous idea entertained is, that poultry will never thrive well in a confined state; whilst, in fact, they will thrive much better, and be much more productive than when left roaming about in all weathers in search of food, provided the directions given hereafter are implicitly followed. However, it is so far true, that poultry confined in a damp and ill-ventilated place, and having a deficient and ill-adapted diet to their confined state, can never thrive; but whose fault is this? Why, it might as well be said that a person cannot thrive during solitary confinement, when it is well known that prisoners with a regular diet, comfortable cells, and appropriate labour, soon become very sleek and healthful in appearance, and that in proportion there are less disease and fewer deaths in prisons than among the free population who are compelled to seek a precarious living in all kinds of weather, and whose homes are wretched hovels, deficient of all sanitary requirements."

The work before us concerns itself mainly with the keeping of poultry on a large scale, viewing all the points, as the title indicates, from a commercial point of view. Although published in America, it is, in fact, the reprint of an English work, being that of Mr Geyelin, who was the promoter of the National Poultry Company at Bromley, Kent—the only part strictly American being the introduction, which is from the pen of Mr C. L. Flint, secretary to the Massachusetts Board of Agriculture; and of which introduction the principal part is a description of his mode of "finding success" in rearing poultry and eggs on a large scale. Mr Flint advocates the use of movable houses, or "coops," to be placed on and moved from point to point of a grass field. Mr Flint appears to think that there are greater chances of success in working on a large scale where the production of eggs alone is the object sought after rather than that of poultry; but, as will be seen from the extract above given, Mr Geyelin looks to the poultry themselves, as well as the eggs they produce, as a source of profit. The following is Mr Flint's description of this "coop system of feeding poultry on a large scale":—

"No doubt the soil of any location has an important influence on the health of poultry. A cold, heavy, undrained locality is quite unsuited to the poultry-yard. The soil should be warm, dry, and sunny, one that is good for grass. If plenty of fish offal were accessible it should furnish a considerable part of the food. As to breed, it might be any of those commonly known as 'everlasting layers,' of which, perhaps, the Leghorn, sometimes called the White Spanish, or Andalusian, is as desirable as any. To meet with eminent success on a large scale, it would be necessary to resort to artificial hatching and rearing, both of which are perfectly feasible; for no one could afford to rely upon hens for this purpose where the primary object was to obtain the largest number of eggs. Suppose, then, the chickens were hatched from the 1st of April to the middle of May. At five weeks old they could be turned out and treated according to one of the following systems:—

"1. Enclose grass land in quarter-acre lots, with a

oultry house in each, or a quadruple house in
tre of four lots, with accommodation for fifty
never more. Young chickens might do well in
hat larger numbers throughout the summer. but
d be safer, as a general rule, to limit the num-
fifty.

Build coops of lath or thin boards, about 10
ıg, 4 feet wide, and 2 feet high—4 feet in length
end to be a tight house, or coop of boards, with
nd feeding conveniences, water, &c.—the lat-
ortion to be bottomless. Arrange handles at
ıd, so that two men could lift and move the

Set these coops upon grass ground, and move
heir length or width daily, thus affording a fresh
un. Twelve chickens should do well in each.
n as they can be distinguished, separate the
rom the pullets, and *never* allow them together
for breeding purposes afterwards. As soon as
ks are marketable, sell them, reserving only the
dividuals as breeders, with little, if any, regard
anguinity. Keep an unlimited supply of cracked
efore them until they are large enough to eat it
when it may be given them uncracked. This,
rass, is their main diet. Give also some variety
little animal food. The pullets should begin
early in October, when they should have plenty
waste, and lime in some form, in addition to the

In twelve months from the time they begin to
y should produce one hundred and fifty eggs
nd if properly cared for they might do more.
n as the hens stop laying and begin to moult,
l sell them. The white Leghorns are always
or the table.

lo not know that this movable coop has been
a large scale ; but there seems to be no reason
should not prove successful. Grass will grow wonderfully under it; and this could be used either for soiling or for hay. Some other conveniences would, of course, be necessary in winter.

"A coop of the above-mentioned size would accommodate twelve laying hens; and four of them, with forty-eight hens, would probably do better than the same number in the enclosure plan, and avoid the necessary investment for fences and repairs. Some say poultry in such confinement, when *all* their wants are supplied, will pay better than when running at liberty, either in growth, fat, or eggs; and it is probably true.

"Now, if one coop will succeed, or if one enclosure like that described will succeed, what conceivable reason is there why any number should not? We all know that success in anything depends as much upon details as upon plan. Without attention to either, failure is certain. With only one, success can be but partial."

The proportion which Mr Flint's remarks bear to those of Mr Geyelin in the work remind us of Falstaff's "half-pennyworth of bread to the half-crown's worth of sack," for by far the major portion of the work is taken up by a reprint of Mr Geyelin's work, descriptive of the appliances used in keeping poultry on the large scale. The rules to be observed in breeding, hatching, kinds of food, and modes of feeding, the races of poultry, their diseases, and the killing and dressing of them for market—all these, and more than these points, the reader will find fully discussed in the work; for, in addition, a large section is devoted to artificial hatching, with the apparatus employed, to which are added two reports on the poultry establishments of France, from which alone a vast deal of information, both curious and practical, will be derived. We have only to add that the work is profusely illustrated.

The Garden.

TENDERNESS INDUCED IN SOME HARDY PLANTS BY AUTUMN GROWTH.

IT is a well-known fact that many plants perish, or at least suffer material injury in our comparatively mild winters, which in their native countries annually withstand much lower ranges of winter temperature than are ever experienced, even in the most inclement parts of the British isles. And this seeming incongruity is satisfactorily accounted for, from the circumstances of our summer and autumn temperatures being insufficient to produce that perfect maturation or ripeness which they acquire in their native climates. Hence it may be too generally assumed, that, in consequence of the unprecedented warmth of the weather throughout the past growing season, those plants above alluded to will be in a great measure exempt from harm throughout the coming winter, and consequently that the ordinary amount of care bestowed upon their protection may be entirely or at least in a great measure dispensed with. It should, however, not be forgotten that the warmth of the past season was associated with other meteorological peculiarities, which, in their effects upon many plants, not only counteracted those arising from its extreme heat, but have in fact rendered them more than usually susceptible of injury from frost, and necessitated the taking of more than ordinary precautions for ensuring their safety.

It will be recollected that towards the end of last spring the soil was thoroughly moistened, and in many districts hurtfully saturated by frequent rains, which ceased somewhat abruptly. Then succeeded more than two summer months of excessive heat and drought, which in turn were followed by frequent heavy showers, associated with more than ordinary warmth continuously, till what may be termed the end of the growing season. These characteristics of the past summer and autumn induced the following results—viz., rapid development and growth in the first place, arising from the combination of warmth with a sufficiency of root moisture, till the latter became exhausted; when, in the second stage, the growth became prematurely checked and stopped in consequence of the drought; until followed in the third place by the renewal and continuance of vigorous growth, arising from the vivifying action of heat and moisture upon the drought-checked vegetation; and which late unseasonable second growth is the cause of that non-frost resisting state into which many plants have been thrown, and from which highly injurious effects may be expected, unless they are timeously protected, more especially should the predictions of the weather-wise in regard to the unusual severity of the ensuing winter be realized.

Among the most important of our cultivated plants that have been stimulated into renewed or second growth, by the warmth and moisture of the ending summer and early autumn, the potato may be allowed to take precedence. And, although it has this year almost escaped the rot-disease, the crop has been very generally affected, as well as deteriorated in quality, by the protrusion of both new or supplementary tubers and young shoots, from the terminal eyes of the older ones, which had been stopped or checked in their swelling in consequence of the remarkable dryness of the soil. Of other field crops the different varieties of swedish and common turnips, mangold wurtzel, carrots, and cabbages, in many districts shot out flower stalks, although neither their roots nor tops

tained to half their usual sizes. Among
trees we will only name the larch and
ruce, of which many growing on dry
ere so severely checked that in por-
f both their roots and branches death
sued; and as these, as well as most
coniferæ, are incapable of either over-
g or resisting such injuries, largely
ped heart-rot and other diseases may
e looked for in such drought-stricken
Larch has also this autumn exhibited
ny parts of the country the unusual
menon of second leaf growth, this
tender foliage being usually most pre-
on the sunny or warmest sides of
, middle-aged, and oldish trees, im-
g to many of them a delicacy of colour-
eauty, and freshness, surpassing that of
young leafage in early summer; inas-
, as unlike it, this was not disfigured
ther insects or their exuviæ. Much
his unseasonable foliage has been
d and withered by the early frosts,
seems likely to remain so throughout
inter. Nor are the young frosted shoots,
ich it is adhesively retained, likely ever
clothed with verdure again, but rather
main till, through decay and rotteness,
rop piecemeal to the ground; so that those
elieve in the degeneracy of this most
of forest trees will point to them, as an
nce of what they deem an undeniable
forgetting that this seeming degeneracy
wth in the plants was only of chance
tal origin, and not consequent upon any
ted declension of health or vigour in
ecies.

rden plants being vastly more numerous
diversified than those of the farm or
, it is among them, and more especially
of shrubby or ligneous growth, that
ndering influences of their late unsea-
le development are most to be dreaded;
e have accordingly a long list of those
will require unwonted protecting care
ry them in safety through the coming
r. The summer-matured leaf and
-buds of Rhododendron Thomsoni,
ther Himmalayan as well as more nor-
Asiatic species of this most splendid
race of hardy evergreens, which should have remained inert till spring, have, instead, pushed out with autumn shoots and bloom, and the same has taken place with many of the gorgeous hybridal varieties of this, "the king of flowers;" so that these will not only be shorn of their spring beauties, but the abundant ascent of their still unelaborated and unreturned sap will render them peculiarly susceptible of injury from frost. Nor is "the queen of flowers" less safe from like harm, for the numberless and widely varied beauteous autumnal flowering roses, now so universally cultivated, have made up for their summer barrenness by an exuberance of late growth and gaiety of bloom, which even the recent smart frosts seem to have in no way impeded. Berberis Darwinii and the pretty B. stenophylla have lately been so clothed with their richly golden yellow flowers, that no flower-buds seem left to furnish the usual spring display; while bays, laurels, many ornamental coniferæ, and others, have protruded an abundance of young shoots, accompanied in some instances with their inconspicuous, untimely inflorescence. Some deciduous garden plants, as well as evergreens, have been stimulated into autumn growth, although examples among them are proportionately less numerous. The Victoria plum has in different districts blossomed, set, and ripened fruit upon summer-formed shoots; many apple, pear, and other fruit trees have blossomed, and set fruit on some of their branches; and many ornamental trees and shrubs, growing on dry rocky places, where their first foliage was less or more withered by the extreme drought, became again covered to a less or greater extent with young foliage, which in some instances still remains green, although that of the same kind has fallen from more favourably situated trees. Various expedients for protecting these unseasonably stimulated plants will occur to practical gardeners, but one of the simplest and most effectual is to lift and re-plant them as soon as possible, which will have the effect of materially diminishing their over-abundant sap, and thus rendering them more capable of resisting

frost, a mode of treatment which is specially applicable to roses.

From some of the effects produced upon plants by the peculiarities of the past season, good practical lessons for their treatment may be derived. At page 460 an account is given of the autumn flowering, or rather the shooting up prior to flowering, of six Yuccas at Fingask Castle. These plants we had an opportunity of examining just after the termination of the great drought, at which time they exhibited no appearance whatever of running to flower, but only that of fine handsome plants, which might be expected to bloom within a few years. Standing, however, as they were, on a dry, open-bottomed, rich garden soil, where they must have been thoroughly checked in growth by the long-continued summer drought, their well-known stubborn resistance to flowering was overcome by the copious rains and warmth of August, and they then commenced to shut up, but it is feared too late in the season to allow of their flowers opening freely. Let those persons who wish to bloom their old Yuccas imitate first the checking, and then the stimulating process which these plants naturally underwent, and they may calculate on like success; only care must be taken to do so sufficiently early to allow them time for shooting up and blooming in summer, or in the beginning of autumn at latest. A parallel mode of treatment has long been adopted by gardeners for starting stubborn pine-apple plants; and there are many other shy flowerers to which its application would be equally serviceable. Many celery-growers are this season complaining of their crops having almost all run to stem, even before the plants had attained to half their proper size; from which they should learn to water it occasionally and thoroughly in future dry seasons, so that hurtful checking and stimulating may be both avoided, and satisfactory crops, instead of worthless stem-shot ones, obtained.

THE NEW SYSTEM OF CONSTRUCTING HOT-HOUSES, &c.

"HOT-HOUSES for the million," and "grape-growing by the working-classes," will, as the patentees promise us, be reduced to a minimum of cost, by the adoption of a new mode of construction, which the inventors describe as "The new patent expanding and ventilating system of constructing hot-houses, forcing-frames, and greenhouses." The other advantages may be summed up under the following heads:—1. Portability in the widest sense; 2. Most complete and easily-controlled ventilation; 3. Admission of rain at pleasure; 4. Annual resting of the plants; 5. Perfecting of tenderish late-maturing crops; 6. Production of salad and culinary crops in autumn and winter; 7. Protection of late-flowering plants; 8. Protection of certain ›derish plants without fire-heat. These advantages we further notice in detail as follows:—

I. PORTABILITY.

Farmers, tenants on short leases, and yearly occupants, are often deterred from erecting fruit and plant-houses in consequence of these being looked upon as fixtures, or at least as being so difficult o removal, that the trouble and expense of effecting the same is more than they choose to risk. The patent expanding system applied to hot-houses obviates all such objections and difficulties, as their expeditious removal and re-erection at any time is simple and inexpensive, while their transference in whole or in parts for other purposes, to be after detailed, may be effected with still greater facility.

II. VENTILATION.

judiciously - regulated admission of r at all stages of plant growth, and pecially at and near to the period of ening, is of the highest importance, in secure healthy growth and perfection ur. Its entrance and exit should not, r, be, as is too common, in such a nanner as to cause chilling draughts, as to produce gentle, undulating, or us air currents throughout the whole , which are as essential to proper leaf, and fruit development as they are to enjoyment of plant-house recreations lids or others who are highly suscep- f colds. The patented ventilating admits of this safe, most perfect, and pplied ventilation being given to any d extent between the smallest modi- f airing, and that perfect exposure is effected by the entire removal of the covering. By a modified application ventilating principle, provision is also or combining perfect airing with the te exclusion of rain or external mois- henever the admittance of the same e deemed antagonistic to hot-house ents, or hurtful to either flowers or

III. ADMISSION OF RAIN.

admission of rain at pleasure has hitherto been duly provided for in plant structures, although gardeners ally acknowledge its importance, when- ey remove a frame sash, or lift a hand- o secure the cleansing and refreshing ce of a rainy day, or a passing shower, the growing plants. Rain water is ally admitted to be by far the best tering either the roots or the foliage nts. And while it may be collected oofs, sufficiently pure, for the former e, it is only as it falls from the clouds is fit for washing leaf surfaces so as to te their perspiration to the utmost, nsequently to forward the growth of ants in a like ratio. And at no time ter be applied more beneficially than of rain falling, when the sultry atmosphere is naturally loaded with moisture. Computing an annual rainfall to be 24 inches, it has been ascertained by carefully conducted chemical analysis that it imparts to the earth a quantity of ammonia per acre, equal to what might be expected from 2 cwt. of Peruvian guano, besides nearly 150 lb. of nitrogenous matter, equally suited to the nutrition of plants. Much additional evidence might be advanced, were it needed, to shew the beneficial effects of rainwater upon plant life, as well as to exhibit the hitherto almost all-prevailing reprehensible practice of preventing its natural application to hot-house plants; an omission in cultural management for which the patented expanding system is a complete and easily applied remedy.

IV. RESTING OF PLANTS.

Nothing is more essential in plant cultivation than that of imitating their natural period of rest, whether it be by subjecting them to cold, excessive drought, or otherwise; for our deciduous fruit-bearing trees and shrubs, which are all natives of temperate climates, where frost is less or more prevalent in winter, its influence, when not admitted in excess, is the best for imparting to them that rest, or repose, which it is necessary that they should undergo to prepare them for again bursting forth at the proper time into vigorous bloom and growth, and without which they would ultimately dwindle away into weak, twiggy, barren, and unsightly relics of what they were. Hence the necessity of removing the glass covering off hot-house and orchard-house plants, from the time when vines, peaches, apples, pears, plums, cherries, figs, and others, have fully matured their young wood and buds, till that in which they again require its protection for ensuring the safety of the young bursting foliage and blossoms; which operation of uncovering, either wholly, in alternate sashes, or in other proportions, the patented expanding system admits of being performed with the utmost ease and despatch; and, at the same time, it obviates the necessity for that clumsy application of railways for removing orchid-house and other large tub or pot plants to and from fixed structures.

V. PERFECTING LATE MATURING CROPS.

There are few British residents that have ved for some time in warmer temperate cli-ates who do not miss some of the favourite culents which they there had in abundance, t which only reach maturity in the most vourable parts of our island; and many of ose who may only have heard their qualities ghly commended would like to try, and to dge for themselves. Of these crops may be entioned the tomato and its numerous varie-s, the wholesome and delicious fruit of which, ether in a crude state, cooked in different ys, or used as sauces, soon comes to be ked upon as an indispensable adjunct to the dinner table; the egg-like fruit of different varieties of its near ally, the egg plant, which are scarcely less esteemed, whether boiled, stewed, or as sauces; the cooked green cobs of the sweet, or "sugar" varieties of maize or Indian corn, which are never-to-be-forgotten luxuries by all who have partaken of them at American dinner tables; the numerous cucurbitaceous families of pumpkins, marrows, squashes, citron-melons; gerkins, and other hardiest of cucumbers, which only yield their first fruits before they are cut off by our autumn frost; the numerous highly ornamental, as well as useful varieties of capsicum or Cayenne pepper; the ochro,

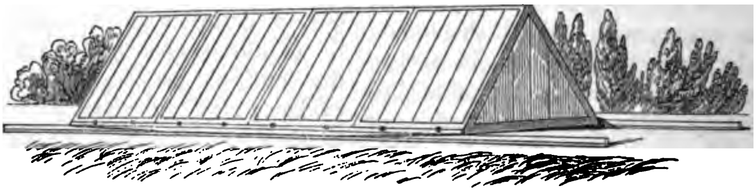


Fig. 1. Forcing Pit, closed.

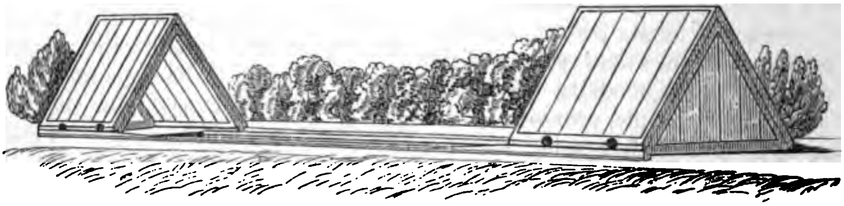


Fig. 2. Forcing Pit, open.

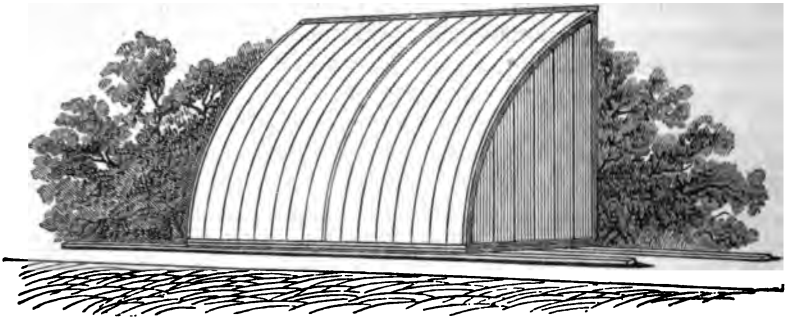


Fig. 3. Forcing Frame, closed.

lmoschus esculentus), that excellent sub- ical substitute for green peas; the tas, or sweet potatoes; the Martynia oscidea, with its curious but excellent for pickling; several species of the family, "green-ginger," &c.—all of which be brought to useful maturity in most s of Britain, if covered by the patent ex- ling frames, which have either been re- ed piecemeal, or in their entirety, from ripened fruit crops, for the purposes of ng their previous occupants.

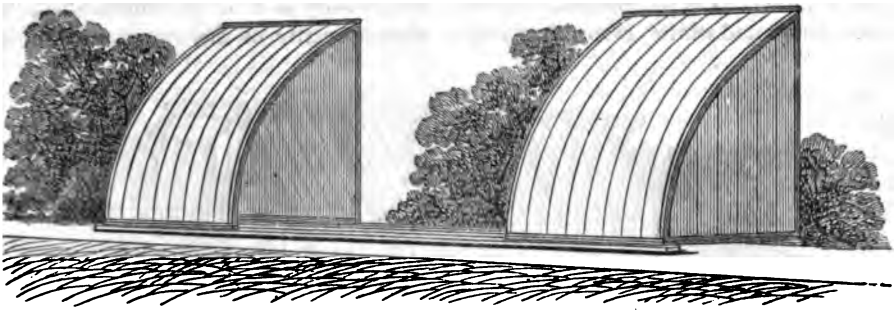


Fig. 4. Forcing Frame, open.

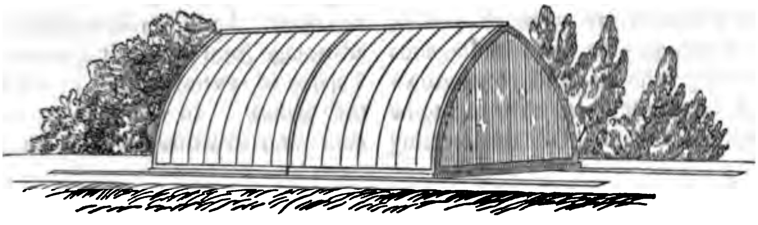


Fig. 5. Forcing Frame, closed.

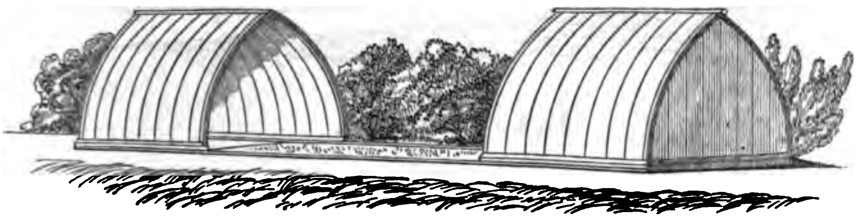


Fig. 6. Forcing Frame, open.

. PRODUCTION OF LATE AUTUMN AND WINTER CROPS.

e smaller structures, when no longer re- d for melons, &c., as well as orchard-houses, which can be spared by the beginning of October, may then be employed (till again wanted, towards the end of winter or in early spring), for protecting and securing a late autumn and winter supply of the most esteemed salad and culinary vegetables, such as golden and other cresses, lettuces, endive, common radishes, cauliflower, brocoli; and young coleworts, turnips, carrots, onions, &c., while by such protection green peas, common, and kidney beans may be produced till Christmas, it being only further requisite that these crops be sown or planted so as to suit the sizes of the protecting structures, in order to prevent unnecessary waste of space.

VII. PROTECTION OF LATE-FLOWERING PLANTS.

It annually happens that by a night or two of slight frost in October or November, many of our gayest and most useful flowers are cut off, or irrecoverably disfigured, when, had they only been protected as recommended above, for late autumn and winter crops, they might at least have been spared till the Christmas holidays, when flowers are so much needed for decorative purposes, to the advantageous saving of many greenhouse and stove-grown plants, which would otherwise have had to be cut at that festive season. Of late-flowering plants which might frequently be thus preserved may be mentioned dahlias, chrysanthemums, roses, pentstemons, pansies, sweet violets, mignonette, tritomas, geraniums, stocks, China primroses, some heaths and their allies, and occasionally wallflowers, primroses, polyanthus, auriculas, carnations, &c.

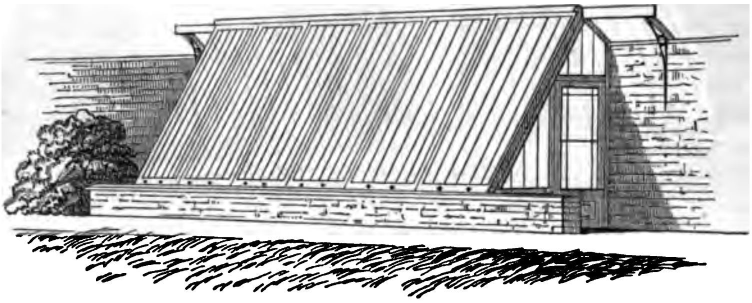


Fig. 7. Greenhouse, closed.

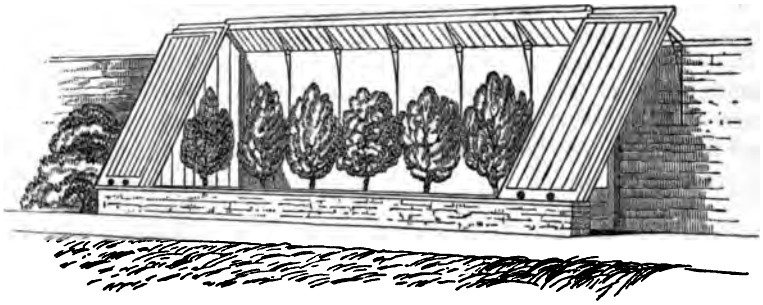


Fig. 8. Greenhouse, open.

VIII. PROTECTING TENDERISH PLANTS WITHOUT FIRE HEAT.

The great protection from frost which double-glazing affords is pretty well understood, although not so much appreciated in our country as it is in others, where the extreme severity of the winters renders its employment highly expedient, or even actually necessary. And in order to derive the utmost advantage from its use, it is necessary to have a space of several inches in width between the sashes. In our climate frost seldom penetrates structures of this kind with such intensity as to injure the hardier descriptions of greenhouse plants. And as the telescope sash, shewn in fig. 5, admits of covering half of the original house-surface with double glass at pleasure, a safe winter protection is thus afforded, without the aid of fire heat, for such as camellias, the more tender kinds of rhodo-

, the hardier Indian azaleas, heaths,
rises, shrubby calceolarias, fuchsia,
ranges, and olives, as well as the
alms, bamboo-canes, and evergreen
gaves, the fine variegated and other
e Australian araucarias, acacias, and
s, the New Zealand fern trees, the
and Dryandras of New Holland, the
es of the Cape, and many others of
endid vegetable forms which are now
indispensable for out-door tropical
g in summer.

ppend illustrations of a few of the
ns of this system.

3 and 4 shew a simple design for
frame of iron, under the new sys-
of the diagrams, as fig. 3, represent-
rame closed, the other, fig. 4, when

illustrates a curvilinear span-roofed
ame of iron closed; fig. 6 the same open. Fig. 1 illustrates a span-roofed forcing pit of wood, closed. Fig. 2 the same open.

Figs. 1, 2, 3, and 4, are made also upon the telescopic and sliding system combined, in which two central frames of larger span are used along with the two side ones, to admit of the small or side frames being slid or moved under them, thus forming a frame with *double glazed walls.* The advantages of this arrangement as a *protecting frame for half hardy plants*, &c., without necessitating the aid of fire heat in severe weather, are obvious.

The engravings only illustrate a few of the adaptations of this important system, by which many advantages in the practice of horticulture can be secured.

Figs. 7 and 8 shew a greenhouse or orchard-house, of either iron or wood. Fig. 7 shewing the house closed, and fig. 8 open.

Rambles by Road, River, and Rail.

A TOUR IN THE WEST OF SCOTLAND.

IV. KILKERRAN.

COMMODIOUS plant-houses are ranged along the south exposure of the garden wall as an adjunct to the flower garden. These houses are of moderate construction, and well fitted for accommodating the greenhouse and stove plants that are mainly grown for table decoration. Among the many common plants that are called in to aid for this sort of work were very fine and handsome standards of numerous varieties of Coleus, not the least showy and effective among them being the high-coloured Verschaffeltii. Take this plant along with some of the feathery-looking fronds of the diversified Adiantum family, the equally diverse club mosses (Lycopodium), and one scarcely could select a more telling subject, barring always the dragons' blood tree (Dracœna), and the various Crotons, which now hold a regal place among in-door plants for table decoration. This is a branch of gardening that requires a cultivation and management entirely different to the use-and-wont system of cultivating plants. In this case vigour, combined with stamina, in the least possible growing space, is what is wanted, and hence mple propagation must be resorted to, and ne older plants, when they shew the least sign of debility, pitched to the rubbish heap. A little judicious forethought exercised, as we have seen at Knowsley, Buchanan, and Kilkerran, keeps up an uninterrupted supply of excellent "stuff," either for massing or individualizing.

Emerging from this subdivision of walled space we find ourselves into the much greater area of the kitchen garden and the fruit and forcing department.

The range is 150 feet long and 15 feet wide; 90 feet of that is covered with vines, and the remainder peaches and nectarines. The peach-trees are in magnificent order, yielding an abundance of extra-sized fruit. In this respect they seem to have taken a position difficult to be rivalled. The trees are trained to flat trellises about 4 feet from the ground. This enables the grower to utilize the back wall space; for while there is a flood of light exercising due action upon the flat trellised trees, it is in no way impeded from acting beneficially towards those that are trained against the wall. In order that no available space may be lost, Mr Barnwell has also led a few branchlets perpendicularly from the table to the rafters, and from these some of the finest fruits have been gathered. The grower summer-pinches his trees, foreshortening strong shoots, and disbudding others that have no claim for a future year's crop. This is wisdom, because space is unprofitably taken up by all those shootlets that he who elects to prune in winter requires to operate upon. Even in early autumn incipient flower-buds were crowded at every eye upon the spurs. There were no signs of gum or canker, or any of the many ills that infest peacheries, and each tree, with its complement of wood and foliage, was more than usually pleasing to look upon. As regards sorts, the Noblesse and Royal George were the elected among peaches, and the red Roman Violet Hative and Elruge among nectarines—the very individuals that have more claim to unanimous suffrage than all the other sorts, and their name is little legion that have been duly nominated, and are to be upon the books of any of our great r commercial houses.

vineries were laden with a great crop

In truth, the staple for root action ave special virtue in creating plethoric- owth without many of its baneful se- s. Moderate cropping seems to be l our great growers advise, but there disposition to use the knife or scissors, t the time of "showing," inflorescence, ning, and so the crop swells out, and the finishing period arrives, when s of infinite importance, there are so sources of demand calling upon the of supply, that a hitch usually occurs g the colouration of both black and grapes. But where there are large s to be furnished the gardener has to and provide for accordingly. Mr ll had probably as heavy a crop of as we have ever seen, barring a house nburghs at Frogmore, some eight or rs ago, and the crop in question was up of largely-developed bunches, large of capital flavour, although not quite black in the one case, or pure amber other, as we have seen in some places. at house, 45 feet long, was clad from foot with bunches, averaging from 2 , and taking a rough estimate of the in the aggregate there would be some- ke 450 lb. of grapes in the house. eight seems extraordinary, but when ders know that the vines are planted feet apart, it is something like 22 a vine rod about 17 feet long. planting has, therefore, advantages. es in this instance were from six to ars planted, and it is just possible, ey arrive at twice the age, the stronger dominate over the weaker, even in the tificial border that was ever made. advantages ultimately are so obvious Barnwell will probably sacrifice every e vine, looking to, and catering for, doing, something like a uniform re- of crop. Other varieties of grapes iscats were quite as wonderful, look- he weight of the produce. Particu- was Trentham Black, an excellent show variety, although it does not seem to have found its way into general commerce. Buckland's Sweet Water was large, and in every way fine, the quality being quite first-rate. Lady Downes, Trebbiano, Black Hamburgh, and Black Prince were all represented, the latter variety particularly well finished.

The kitchen garden wall encloses six acres of ground. The wall is a substantial brick-faced one, 18 feet high. Upon it are some fine wall trees, a few of them very old, looking to the girth of their trunks and their gnarled appearance. It seems to be an object to introduce fresh blood gradually, but the same amount of means and energy cannot be put in force in a place such as this, where the master for the time being is, so to speak, a tenant at will. Plums were a particularly fine crop. It was instructive to observe that Green Gages on the western exposure of an east wall were much finer than those growing *vice versa*. Coe's Golden Drop and Blue Imperatrice were in such profusion, and of so captivating a style, that could well induce "one's mouth to water," but the climate all through Ayrshire seems to favour the plum crop. As it was with plums, so it was with pears, clearly shewing that a good tilth is of high importance for carrying crops of these kinds of fruit to proper maturation. It would be difficult even in the sunny south to match such Marie Louise, and Louise Bon of Jersey, as was grown at Kilkerran this season. Black Hart and May Duke cherries appear to bear in greatest profusion on old trees, judging by what we saw here.

Fine as some of the wall fruit were they were quite eclipsed by the small fruits. Gooseberries, currants, and strawberries might be well equalled, but they could not be surpassed. Doubtless climate and soil have a good deal to do with it, but the system in operation, of judicious thinning out of the wood was of much consequence. Among a host of fine sorts of gooseberries nothing beat the Sulphur, the Warrington, and the Ironmonger, three of the oldest varieties that have been dignified with names.

Passing on, however, to the Melon ground there was quite a sight of extra fine fruit.

The principal crop was growing in a span-roofed house, running east and west, the dark half being reserved for the cultivation of cucumbers. The beds in which the species were both growing were lined or walled up with turf, and bottom heat was obtained by fermenting material, over which was laid some 18 inches of the turf mixture. The sorts of melons most in repute here are Wills' Hybrid, and the Strathfieldsaye, both excellent flavoured sorts, which we can well testify. There were lots of auxiliary dung pits for late autumn supply, and the whole were quite unexceptional. The grower never waters in any of these fermented pits or frames after planting. Cucumbers on the contrary are pretty liberally supplied.

But passing out of the garden into the woods and pleasure-grounds there is much to charm the eye of the arboriculturist. Trees that have lived over a time, fully entitling them to the dignity of being called venerable, crop up about and around you on all sides. The spruce are particularly remarkable for their gigantic stature, some of them having reached the height of 120 feet, and hundreds of them from 12 to 13 feet in circumference. These again rise out of a profusion of copse, with the evergreen of the bay and the Portugal laurels and rhododendrons co-mingling, and where, as in the "Lady's Glen," the steep banks forming a glacis on either side of the water-course, are so clothed, the effect is very much enhanced. So powerful, indeed, seems to be the force of the water current, that boulders, several tons in weight, have been displaced from their natural beds and huddled together at some salient point at the eddy of the stream. The very roots of some of these giant trees, that have been laid bare by the force of an overflowing current, have twined themselves over the boulders in all directions, and, as if in search of water, encouraged their spongioles to dip and feed in the bed of the current. One scarcely knows, in wandering through these sylvan glades, whether most to admire its geological formation, its arboricultural features, or the wild masses of vegetation that carpet its surface. Even the graceful drapery-like folds of ivy that fringe, in admirable confusion, these stratified rocks, are very imposing. Besides all these gigantic specimens of the more common of the coniferous family, there are abundance of good oaks and other forest trees. In some of the more exposed portions of the woods the trees have been largely uprooted by the force of high winds. Young plantations of larch are numerous, many of them of course occupying the position of nurses for a variety of trees intended to remain. Some of the choice coniferæ in the immediate foreground are luxuriating—all the better certainly owing to the shelter that is provided for them. Abies Douglasi would cover 140 feet in circumference, and shewed itself to be in rude health, uninfluenced in any way by our rigorous climate. The same remark is applied to the more tender P. Pinsapo. It had reached about 22 feet high, and massive in proportion; so rigidly formal, indeed, was its outline, as if it had been artificially dealt with. Wellingtonias had been introduced at a more modern date, and it would be premature to express an opinion either one way or other upon them.

The mansion is a plain square house of not the slightest pretensions to architectural grandeur. It is situated in a well-wooded centre, with spacious undulating pasturage. The park appears to be particularly rich, looking to the density and kind of pasture that was being browsed upon by a herd of Ayrshire stock, well known to the agricultural community. Nor were the flocks of Leicester sheep one whit behind in form or condition in the park adjoining, which was partly devoted to a fine herd of the "bounding roe deer." From this park there is a commanding prospect of Ayrshire, rich certainly, agriculturally speaking, more so probably on either side of the banks of the river Girvan, on the low level of the landscape. But what is that monument that we see in the distance, in the form of a spire, on the sky-line? "It was erected by the tenantry to Sir Charles Fergusson, father of the present baronet." The tenant farmers of the county are not so "hide-bound" as some of our commercial friends would have them. Wherever there is a kind, enterprizing, and generous landlord, there is an unostentatious, plodding, and grateful tenantry.

A KENTISH HOPYARD.*

l enough to "watch your Allsop growing"
tender sunshine of a July morning; but
ver realize the fatness of Kent, till you
our bags in bloom," and pay your footing
less hoppers for wandering up their alleys
flower.

"Young and lusty barley
Comes o'er the fields to woo"

ht earnest, when October has set in. Hop-
hen been at work for more than a month;
ajority begin to weary of rural life, and to
e New Cut or St. Giles. An owner must
or a boundless paymaster if he can get his
ed after that date. The Union Jack waves
vast house-cowls, and a tattered handker-
stick does duty where the orthodox "red,
blue" is not forthcoming. Waggons are
in the orchard, and basket after basket of
es is piled on to them. The thoroughbred
n Oaks winner—of which Kent once had
me, Mendicant, and Queen Bertha, within
-almost breaks away from his leader, as a
ppers, who are evidently not averse to "Eoft's
Ales," stagger along with the hop bin, borne
n chair between them. Byron's query—

Vhere are your Pyrrhic dances gone?"

swered by a peep at the wild revelry, which
ht hideous at the hop supper finish.
f them sleep in barns or cattle sheds, which
ed up" annually with boards and brushwood
ut the wind; but a few hop-garden owners
regular set of marquees for their illustrious
ho are more necessary than welcome. The
ion are the best workers, but very difficult
th. They sally forth at night and do wanton
gates, and let the stock out into the roads;
he Irishman is too idle to leave his tent or
d contents himself with potatoes, tobacco,
When a strike is made, the gipsies are
master minds. Either they go to the owner's
masse to parley, and leave the Irish in the
ged not to work under fearful pains and pen-
they drive them to the house at the point of
ole. Irish hoppers attempting a strike on
account is a very feeble business. "They
e so clean a job of it as the gipsies do; they
ok bold, and doddle about a bit, till one or
m are paid off, and then they turn in again;
ops want picking, it's rather denoying." So
nple swain to us, who had observed their habits closely, down to the fact that the Irish will have sixpenny, while others are content with fourpenny ale.

The Milesian mind may show a daintiness in picking its ale, but it shews none in picking its hops. "*We'll pick 'em cleaner, maister,*" is the constant response to all complaints, and they straightway relapse into the lazy old groove. The majority of hoppers work in gangs of two or three to a bin, or a woman will take her children and pick at a basket. Women generally work best, and some of the smartest fingered among them will pick their thirty bushels at a penny or three halfpence her bushel; but twenty-two is a good average. Sometimes they are paid by so many baskets to a shilling; and the quantity required is more or less according as the hops are large or small. Artists compass sea and land for subjects; but a lot of hoppers waiting for their special fourth-class train, seems to have never been thought of.

The station-master has a weary time of it, and he and his policeman must be clever hands at a barricade if they can keep the station clear for other traffic. Hoppers take very little note of time, and if a train goes in the afternoon, the station is in a state of siege from a very early hour, and the

"Little tube of mighty power,
Charmer of my leisure hour"

is glowing all day like a furnace in male and female lips. Most of them carry a can tied to his or her belt, a potato pan, a bundle of clothes, and an umbrella; and there would be no luck in leaving the gardens without a bunch of hop blossom for a chimney-piece token. Sometimes a squalid coquette of a girl bedizens her waist with a couple of dahlias, as the old special pleader said, "to give colour." Two or three comrades may be seen round a hop Nestor, whose legs, rendered more wayward than ever by draughts of "Eoft's Sparkling," have failed him suddenly in the road, while an old hop hag of a mate, with her grey back hair all down, has just "lived the distance" to the station barrier, and is feebly shaking her fist at the policeman behind it. Sometimes the men fight furiously, and end up—when it suddenly flashes on them that we "*don't malice each other*"—with a species of wild dance and bear-like hug. The women are more vindictive; they put down the baby on the road side, and seldom resume it till they have been credited or debited with a pair of black eyes.

Hops thrive best in a southern aspect, and love to couch under the wind, like a hare, on a gentle slope. They enjoy a warm sun, but up to August wet and wind do not greatly hurt them. A damp and warm August, free from wind, is the making of them, and under these influences a crop will almost double its

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he *Gentleman's Magazine.*

Cold wet, on the contrary, quite stops the growth of the bur, and it was this, combined with frost in August, which made the crop of '60 so bad. It is calculated that about 55,000 acres are under cultivation for hops in Kent, Sussex, Surrey (with Farnham as its garden of Eden), Worcester, Essex, and Herefordshire, and those farmers who grow them generally devote to them five acres per cent. They flourish best on pasture land fresh broken up and well trenched, especially if it is a good alluvial soil, not too deep nor too light. Clay requires more trenching and care; chalk does not suit them at all; and if an old hand thrusts down his walking-stick as a divining rod, the smell will guide him as to genuine hop-land. Ten shillings an acre extra is put on for tithe, and "*the parsons whip us up; they be awake.*"

Hops and their mode of culture formed the subject of the leading case, Waddington *v.* Bristowe, on interests in land for nearly a quarter of a century, when one of the acutest judges in the golden age of the King's Bench astonished Westminster Hall by holding that it was not decided on that ground at all. It was, however, duly explained to the court that there was nothing left in the land but the root of the plant, from which the bine was to flower and produce the hops. Such roots will reproduce themselves for fully thirty years, and as they die they are replaced by the cuttings, which have been laid and bedded in sets, and are then planted at the rate of three or four to "a hill." The old hop growers go wandering among the "hills," and turn them up occasionally, to see whether the plants have "thimmed or nidgetted," with as much devotion as a deceased duke of many broad acres and London ground leases might be seen applying his nose to a faulty metropolitan stench trap. If it has been fine dry weather, and the air has got well down to the roots, they nidgett to perfection, as the fibres run right across the alleys, and enjoy the good farming. A hundred acres of hop-land require fully twenty-five men to strike and pole, and trim the roots. Each hill has one plant, and about twelve hundred plants go to an acre. The poles, which very careful growers always tar at the bottom every year after they have been used, are taken from the piles and fixed late in May, when the plants have been duly dressed and cut. The Goldings and the Manningtons have the rankest bines, and therefore require the strongest poles, and cutting down poles n the woods by a regular rotation forms an important tem in Kentish farming agreements. July is the great y month, and many an anxious inspection and earching of heart falls to the lot of the hop sage as he fly produces the nit, and the nit ascends to the ouse stage. Much of the success of the hop grower epends on his occult science in this combat with the d Egyptian pest.

It is a very great point in hop farming to keep the and clean and nicely ridged up a few weeks before picking, so as to let off the rain. The average of crops 17 cwt. per acre, but in the most favoured Kentish ots it will reach 30 cwt. during very good seasons. The largest Sussex crops are to be found round Uckfield, but 25 cwt. is about their limit, and the growers sometimes suffer from a total blight. They are, as they themselves allow, generally in extremes. Mr John Kenward, who is quite the father of hop bettors and Sussex hop growers, had sixty tons one year from sixty acres. They were grown in Little Bowstead, a mile from Uckfield, on stiff land which required at least fifty loads of good rotten dung to the acre. A great crop often weighs badly, as the hops come too large, and lack the rich dust and seed quality of the smaller sort. Sixty bushels to a hundredweight is considered a good weigh, but in some years seventy will not pull down the scale, and it will take eighty if the hops are very bad. It is the green hop which sells, and therefore there must be an early pick to ensure colour, even at the risk of bleeding the bine. Where it is impossible to have them green, the next step is to prevent their being brown, and to turn them yellow by a brimstone application. The common measure is by the pocket of 1½ cwt., and the bags, whose texture is such that "as coarse as hop bagging" has become a county phrase, generally hold 3 cwt. The Kentish brand is the Flying Horse, and not a few dealers in other counties have got "into trouble" for adopting it. and had to take their choice between a £20 fine, or "three months." Sussex has no brand. Hop bines always come in useful for litter in the straw-yards, or thatching, or as shelter to lambing folds. When dried up, it might be taken, by its smell and texture, for a tea plant, and sheep eat it with a keen relish when chopped up small.

There is "only a ditch" between Sussex and Kent. and some hopyards are half and half in each county: but still the best Kentish hops always command a larger price in the Borough. Branckley and Wormenden, near Lamberhurst, are the best Sussex parishes; but the growers confine themselves to the Grape, Jones, and Colgate sorts, and never essay the Golding, which thrives best on a chalk and lime subsoil, and not on a clay or sand one. Maidstone and the adjacent parishes of Hadlow, Farleigh, Wateringbury, and Yalding, many of them on the ragstone, are the Kentish head-centre of hop plantations; and fruit and filberts also abound. Ellice is an historical name round Farleigh, and a grower alluded to the family, in dark speech, as having "four hundred acres, and perhaps a good many more." The Canterbury growth, like that of Mid and East Kent, is the mother of pale ale; but the quantity and quality of the hop falls off as you get nearer Deal and on to the chalk. The Golding hops, which are always very free from mould, require a beautiful light loam; and their magnificent rich colour, coupled with their superior flavour and quality, make them an essential to Bass and Allsopp. They will fetch eight guineas per cwt., when the best Jones's can can only reach £5, 10s. The pale ale brewers use some of the richest of the latter sort; but still they work almost entirely on Goldings and Bavanes. Jones's, which are always the first ready for picking, st in the Weald of Kent and Sussex. They prolific, but the best sorts have quality enough r the Burton business. Grapes press them point of early picking, and are the largest sort while Colgates are the latest and the smallest, sometimes sold at from 6d. to 8d. per bushel. t of production they are almost unlimited on nd, and if they are late picked and well-con- l, Barclay & Perkins rejoice in them. In fact, eral thing, brown hops and black malt are the pair in porter.

: Maule, who drank porter to "reduce my wits evel of counsel's," might have modified this *ctum*, if he had known all the stirring Borough associations which cling to the Barley Bride in rse from the blossom to the pewter. "The nt near the Town Hall," says a writer, "was tersall's of these peripatetic philosophers; and p county sent its speculative contingent on a . They would meet at ten o'clock and bet till en fly to Mark Lane, and have another bet here, amongst the corn-stands. If the May-fly peculation would begin about the 30th of the and be at its hottest in July. Fully a hundred men would have books on the crop; and the ewers would send their commissioners to back gainst the duty. They always looked upon ll's with contempt, on the short and not un- ble ground that '*if you back the duty it always ut fair; but a horse may tumble down, or be , or a thousand things.*' And who can gainsay eference? Year after year the names of Ken- Iarriman, Monk, Clements, Goble, Trimmer, ed the market; and those did best who always ent their guide. Father and son often follow e trade. There is a story of a father remon. with his first-born upon the practice, and to settle £100 a-year on him if he would off. '*That would never do, father,*' was the *I win £200 a-year off you.*' And '*I'll bet you don't,*' was the rejoinder. Those who the duty (*i.e.*, to be over a certain amount) en years out of ten, and their loss was the voking when, in 1855, they braced themselves ck £400,000, and it only fell £2000 short of great hop factor always laid against the duty, only on the right side twice in twenty years. a good man for the farmer, as the more he nst the duty, the more he 'rose the price' of hops. He always speculated, as a factor for a short crop; so much so, that when others were backing £100,000 duty unlimited, he would be laying against £60,000 unlimited, and trusting to his double pull to get through. With a less daring outlay, the system might have answered, as what was lost in bets might have been more than made-up by sale commissions. On one occasion, when a great grower had a large quantity of hops to sell, he laid two factors £500 each, when hops were at £5, 10s., that they did not reach £7 per cwt. The knowledge of the bet sent up the market, and thus the grower dropped £1000, and yet won £500 on the transaction by the enhanced price of his hops. One man's losses alone have been known to reach £30,000 in a year; and one *annus mirabilis* saw a factor leave off with £60,000, a triumph which he celebrated by a dinner worthy of Apicius, and half-guinea whist points after. Hop-bettors generally whetted their tusks each Monday with a rubber at whist on the railway journey to town, and the dinner-table was also a favourite 'Change. They would bet upon anything, and one of them was once so uplifted by good cheer and loyalty, that he laid £100 to £1, before the cloth was drawn, on the taking of Sebastopol.

"The crop of 'sixty was a wretched one, and it is a cherished tradition of the Borough, that a speculator, who did not believe the signs of the times, bought largely at £7 per cwt., and held till they were down at 25s. The most careful men seldom opened their mouths on Monday, unless they had first-rate information, or had made a Kentish journey of observation the week before, and determined to back their judgment; and one first-class judge would make £5000 a-year this way, by almost invariably backing the duty. The great secret was always proclaimed on November 5th in the *Gazette*. On December 1st the bettors met to compare books, and I O U's for the losses were handed over, made payable for New Year's day; but five per cent. was always deducted for ready money payments. Old speculators yearn for those days once more, and Guy Fawkes only seems like the wan ghost of a duty they adored. Some of them tell tales, which lengthen at each repetition like the sea-serpent, of the smashing blows which were dealt against the duty by their metallic heroes, and the equally daring defence; and regard the Borough as a very Waterloo in which they fought and 'bled.'"

Plantations and Hedges.

ON PRUNING AND THINNING FOREST TREES.

THE degree and nature of the preparation of the ground for planting depends, of course, upon the condition of the land itself, and may be comprised under the following heads:—1, Clearing the ground; 2, trenching; 3, ploughing; 4, manuring; 5, draining; 6, enclosing; 7, arranging spaces for roads; and 8, deciding on the trees to be planted.

1. *As to clearing the ground.*—Of course if the land is arable or in pasture it will require no clearing; but if outfield, or if woodland—that is, if it bears or has lately borne a crop of trees, the proper clearing becomes a matter of importance. We need not complicate the subject by keeping the case of growing timber distinct from that of the roots of timber lately cut down. To that complexion they must come at last. The first question in such a case is what course should be followed as regards the roots—leave them in the ground or grub them up? This is one of those oft-recurring cases where we are driven to choose between what is best and what is most expedient. We believe that it is best to remove the roots, but we fear that it is more frequently expedient to leave them alone, simply on account of the expense which it would cost to remove them, and because it may thus be cheaper, both as regards time and money, to wait and supply any blanks that may arise from having been planted among the old roots. But, as a matter of preference, it is pretty clear that the roots are better out than in.

If we dig up the decaying roots of a tree which has been cut down, and killed a sufficient time previously, we shall find in many instances that the roots are covered with a small fungus, which penetrates through the substances of the decaying wood. If a young tree has been planted over this, its roots, too, are soon attacked by the fungus. Whether the roots of a large, strong, full-grown tree penetrating into such a mass would also be attacked, we do not know. Perhaps their strong vitality might resist the attacks of the adversary: but it is certain that it is not so in young trees—at least, not in all. The Rev. Mr Berkeley gives a good illustration of this. Two Deodars were planted in his garden near each other, in the same soil and same exposure—in short, apparently in all respects under identically the same conditions. The one throve; the other did not. After a time, he took up the sickly tree, and found that its roots were in the midst of decaying roots covered with this fungus, and that they also were penetrated by it. It had been planted on the spot where an old peach-tree had been cut down and the roots left in the ground. This, therefore, is a danger to which all young trees planted after a previous crop of timber are subject; and not even extracting the old roots will wholly protect them from it, for it is impossible to take up all the rootlets, and portions of root will unavoidably remain. On the other hand, the fungus does not always attack the roots. It is not every place or time that is favourable for its development, although we may rest well assured that when favourable conditions do present themselves, the fungus is certain to make its appearance.

Wherever much care is desired to be bestowed upon a plantation, therefore, the old stumps should be removed. But where expediency rules the day, and it is resolved to let them be, the great thing to be attended to is to keep the young plants as clear of the old roots as possible, and to be particular in

up the young plantation ; and if any
eterate spots occur, it may be neces-
dig out the old roots there after all.
ll for the planter to know to what the
hy state of his plants may be due,
e sees them failing under such circum-

re here tempted to give a notice of what
ider an excellent root-extractor ; but
re rather giving an extract of our
the general principles on which plant-
uld be conducted, than a particulariza-
details, we shall refer our readers to
strated *List of Implements*, now in
of publication in this journal, for an
of the different apparatus used for
pose.
ad of woodland, the ground to be
is perhaps outfield. In that case it
covered with furze, sloes, brambles,
underwood of any description. All
uld be cleared away. None of
erhaps, require special considera-
cept the furze. Many people are
with burning it down, or cutting
y the root, trusting that if the two
r the trees will outgrow and choke the
thers prefer to grub up the furze by
. At first sight, the latter would seem
t reasonable plan, and that most likely
ed ; but there are always two sides to
on, and there is something to be said
favour of abstaining from rooting out
e, and contenting ourselves with
it from the surface, and seeing that
g trees have a fair space in which to

e first place, there is some saving of
; and although we should never
end a saving made at the cost of
ent success, most people like to make
it can be effected without injury.
hen the young plants start, the young
ws with them, and proves an admir-
lter for two or three years ; and as
the trees overtop the furze, it is
g how rapidly they choke it. It
ever, desirable to make assurance
ure, and to remove all doubt as to
ng trees being able to conquer the
furze ; and this will be effectually done if we head down young shoots of furze which come up the first year, and so throw them back another year behind the trees. This is very easily done, for the shoots are then soft and green, and a man can clear them quickly away with a hedge-bill or sickle, and the doing it has the additional advantage that it kills a certain proportion which may be unable to stand two years' successive deprivation of shoots and leaves. We have seen many plantations with the furze so left, and we cannot say that we have observed any inferiority in them to those where greater preparation has been made, and the furze bodily extracted. Another reason for letting the roots alone is, that do what we like we shall be unable to remove them so effectually as not to leave a sufficiency of young suckers, which will in our despite send up a fresh crop next year. Every one, who, in taking in land, has had to clear a field from furze must remember how difficult it is to get it out of the soil. It will pass through a five-shift rotation, and no sooner is the field laid down in grass than it shews itself again.

2. *Trenching.*—If, however, it be resolved to take it up by the roots, the grubbing of it up is to a certain extent equivalent to trenching ; and where it has been adopted, trenching is usually also carried on simultaneously. As to its being beneficial, however, we have great doubts, except in exceptional cases of deep rich loam. In the majority of cases, the chief effect of trenching is to reverse the position of the good and bad soil ; to bring the bad soil to the surface, and to bury the good soil out of reach of the roots of the young plants. Where the soil is naturally so constituted as to require opening and dilution, trenching may be beneficial ; and it is singular enough that it is just in such circumstances that most of the cases that are referred to as instances of the beneficial effects of trenching have occurred. Trenching is expensive, consequently is first practised on those parts of the estate which are most seen. Those parts which are most seen are those around the house ; and those around the house are precisely those which are richest, having been

"infield" for centuries; and more highly manured and worked than any of the rest of the land; possibly too, those which, from that very manipulation, will be most benefited by a change of treatment, or by the introduction of new elements of soil. Consequently we do not think that the ordinary cases of successful trenching can be referred to as fair indications of what would be its general result were it more extensively resorted to. Its expense, too, must always militate against its general adoption, and in no case ought it to be had recourse to until after a very careful examination and study of the constituents of both the soil and the subsoil.

The Stable.

THE HISTORY OF NEWMINSTER'S CASE.

By Joseph Gamgee, Sen.

: character of Newminster, as a race-
iorse and stallion, is embodied in the
of the turf for the last eighteen years,
of his case has to be recorded.
: disease, pain, and the consequence
—lameness—can be understood, the
conditions of the parts subject to
ienomena, must be intimately known,
ame or sight merely, but by handling
dying in all their relations. From
is or partially conceived notions about
truction of the horse's foot and its
s, confused ideas of its derange-
and the causes of these fol-
There were abundance of coun-
n Newminster's case, as was made
the statement, that "some of the
erinary surgeons in the kingdom had
n, and had declared his case to be
." My own interest in Newminster's
k place at a most critical time, and,
ry different premises, I arrived at
pposite views on the character of the
and the chances of affording relief, to
ose who had previously been consulted
the long course of the horse's
.

I began to treat the horse, he was in
: that only made it a question of days
ow many might pass before death
nsue. Remedies, it had been pro-
. and was persisted in, there were
and spontaneous relief was quite
ie question, until the resources of art
ought to the removal of causes,
me of the consequences which,
iints and absence of proper preserva-
ans, had been induced. Had my
nt failed, under the circumstances, to give the relief I anticipated, I should have advised the putting the horse out of his misery without delay. As is common with those who assert that a case is incurable, extreme adverse notions are entertained regarding the possibility, antecedent conditions are referred to, and incidents dragged in, which, if scarcely relevant, imagination adjusts. So in Newminster's case I was told that he was the victim of feverish feet, requiring special measures, on the part of the trainer, all the time he was undergoing the preparation for the St Leger.

I happened to have seen Newminster win the great race, and his admirable form, action, and condition, were phenomena which had been impressed deeply on my memory. But I could not deny that statement. Those who made it were in Yorkshire, with opportunity of hearing and seeing everything about the horse, and I, then in practice at Florence, was only in England for a few weeks in that summer of 1851, when Newminster won the St Leger, and did not see him again until the winter of 1856-57, when he had been two seasons at the stud, one of these at Rawcliffe, where I found him in good condition, and grown into a wide, robust, and beautiful stallion. His fore feet then were noticeable for their thin and flat soles and relative obliquity of the walls. I saw him again at Rawcliffe in the winter of 1862-63, then also in good condition, but the abnormal condition of his feet, which I observed to be in progress on the previous occasion, had increased in degree on the latter. Lastly, I saw the horse in October 1867, when my attendance on him and treatment commenced, and which I prosecuted personally up to the end of November, after which, as will be shewn, though what I had inaugurated was availed of for nearly two months afterwards, and partially perhaps as long as the horse lived, yet my responsibility and means of improving him were arrested.

As described in the first part of my communication on the case, on the 28th of November, I applied a starched bandage, pasteboard splints, and cotton-wool padding to the near pastern joint. I remained that night at York, and returned next morning to see the horse to judge how the encasing apparatus answered the purposes for which I adopted it, after it had become dry and solid. We then walked the horse out, and I was extremely satisfied with future prospects, as all of us seemed to be of past progress. I stayed at Rawcliffe several hours that morning, and was meditating on a new plan, about which I had been sometime thinking. I wanted to bring a return to his feet and limbs of those natural functions of which the horse had been for two or three years almost entirely disabled. I thought of doing for the patient what a good surgeon would do in the case of a man long lame, bedridden, and afflicted with bed sores. After due restoration he would prescribe crutches, send his patient into the open air, and encourage him to use his limbs. Crutches we cannot use for horses, but I determined on giving Newminster the benefit of a sling, to be put into effect as soon as the condition of the near fore pastern joint became a little further restored, a consummation I looked for speedily through the aid of the stationary apparatus I had just applied. Aided by the grooms, I found a stall adapted for the horse to stand in, and the building strong enough to bear him in the sling, but neither Mr Martin nor Mr Day being then present, and as the time was drawing near for the Scotch train to pass through York, northwards, I left, stating that I should write instructions of what I required to be done as soon as I got home.

Accordingly, I wrote to Mr Martin from Edinburgh, on the 30th November, explaining my plan, and also to Mr Day, by same post asking him to devote himself to the carrying out of the scheme, detailed directio for which were given in my letters to hims and Mr Martin. The object I aimed attaining was to support, but not to raise t horse off the ground—to bring the feet i their natural relation with the limbs and bo and to induce movements of the joints wh had suffered from the horse's long inabilit stand on his feet. Besides the original eased conditions, I had to combat those wh had followed—effects which had bec new causes. I requested that as soon as sling could be got up (and I learnt when Rawcliffe that Mr Day had one) the horse should be taken into the stall allowed to stand with the supporting b drawn up to the chest and belly, just s ciently for him instinctively to rep upon it, yet using his feet on the ground. intended that the horse should be kept in position for two or three hours every m ing, and then be walked back to his box left free.

Meanwhile I was engaged in extempori another apparatus intended to supersede starched encasement, when the near pastern joint should by the supporting ai the latter become sufficiently well to b movement.

I applied to Messrs Young & Co., well-known surgical instrument makers Edinburgh, to aid me with their skill and gestions in the accomplishment of object, but in order that we might see w we were about and mutually help each ot in the plan. I procured the near fore l of a horse, the proportions of which were ficiently like those of Newminster to se for measurements. From my dissections explanations, Mr Young executed a draw for his men to work by. The object view was the extension of Newminster's fore foot from the pastern joint, which been in a state of disuse, and consequ disease for many months, if not for ye Owing to the diseased condition of coffin bone in the first stage, and natu provision to displace that bone out of line of bearing, the foot was drawn ba wards and inwards, and the lower

y of the shank bone was over-shooting,
ng against the boundaries of the joint in
nd becoming a source of injury to the
e and ligaments: the outer condyle of
non bone itself was exposed to and
ng from external injury whilst the horse
its side. To recover the health and
that joint, the foot was therefore re-
to be extended by degrees, and to
hat it was necessary to keep the limb
e time extended by fixing the horse's
to obviate flexion of that and the
n joint of the same limb.
ing some suggestions from previous
ors of splints for the legs of human
ts, our apparatus was to have been made
od, adapted and extending from the
part of the arm, down to the pastern in
with corresponding parts behind the
hrough which a steel rod passed from
ck of the knee to the heel of the foot.
ubber padding and leather strap fasten-
ere to have made the whole secure and
nd a regulating screw acting on the
od afforded control over the horse's
o as to extend it to any desired angle.
pparatus was intended to have been
n every morning after the horse was
to the stall and secured in the sling,
he time of his staying would have been
sed according to the effect observed
joint regained its health and functions.
taying the allotted time, the apparatus
have been taken off, and the horse re-
to his box. It was expected that
these measures, in the course of a
or five weeks, the horse would have
o restored on his limbs and re-esta-
l in health as to have commenced the
1868 better than he had done any one
e previous three or four years.
le we had been maturing this plan, and
waiting the completion of the instru-
I had been anxiously expecting a letter
York, in reply to mine, with the re-
f the horse's progress, under the trial
sling, with the security given to the
n joint by the starched apparatus.
length letters came respectively from
artin and Mr Day, both of the date of
December 9th. Mr Martin in his letter, beginning with apologies for delay in replying to three letters received from me since I had last left Rawcliffe, says, "I wished to see if the bandage put on Newminster's leg was of any use, and I am sorry to say it has been of no use whatever. I am still of the same opinion I have always been—viz., that his is a hopeless case, and that it is of no use spending time and money about him." This epistle ended with expression of thanks for my attention, &c.

Mr Day's letter, dated from his veterinary establishment at York, December 9, 1867, begins also with apologies for not having replied sooner to mine of November 30th, but gives as his reasons for the delay, pressure of business and the state of the weather. Neither correspondent makes any allusion to the advice and instructions my letters contained, beyond stating that they had received them. Mr Day was very brief in his remarks on Newminster, whose case I regarded as one of more interest and importance than any other that had been committed to me in the course of forty-five years' practice. After discussing the state of the weather, Mr Day states, "I do not see any improvement in Newminster; in fact, the near-side knee is considerably more over."

With the above letters our correspondence and my connexion of Newminster's case terminated. It must be kept in mind that the comparisons which Messrs Day & Martin set up in their letter of excuse of December 9th are not meant to have reference to the period when the horse's case was hopeless, but to his state when I last left him, on 29th November, ten days previously. Nor do they pretend to anything more than guesses and fancy. One of the gentlemen had been waiting to see if what was being effected, according to a well-devised plan, had done good. Without the least thought or idea whether immediate advantage should have been expected, or inquiring whether some direct restraint was not given with the view to the attainment of an indirect but permanent and great advantage. Mr Day again thought that 20 yards of calico bandage, splints, and padding had not improved the appearance of the limb, and he did not extend his thoughts to the conception of a necessity for the horse's knee being kept bent for the time, to accommodate the position of the pained pastern and foot.

Six weeks after the date of the two letters above quoted, I was favoured with another from Mr Martin, who, writing from Rawcliffe on 22d January 1868, says, "I thought you would like to hear how the old horse getting on. When you left here last I thought you had done too much to N minster's feet. I am, however, happy to he is now doing very well, and our bl smith has entirely got rid of the nasty, u toe end of the near fore foot, and the one will be in the same state in a few da

[To be continued.]

The Dairy and Poultry Yard.

GENERAL NOTES ON POULTRY-KEEPING.

BY "THE HENWIFE."

OF THE RESPECTIVE BREEDS OF FRENCH POULTRY.

E been requested to give my opinion
1 the merits of the respective breeds
h poultry; and although I have
ritten an article on the "Houdan,"
repeat any testimony as to its
ualities, whether viewed as table or
namental poultry. My experience
acquired principally in Scotland;
if any birds thrive in this cold and
p climate, they ought to do even
more favoured quarters. The
," "La Fleche," "Creve Cœur,"
Bresse" breeds are all excellent as
ltry, and all lay large white eggs
ost equal regularity, perhaps the
Cœur" less frequently than the
d they are also decidedly the most
t upon a dry soil, good exposure, and
le housing. The "Houdan" is
ly, and can live anywhere. They
moult with ease, and are precocious
'ullets hatched in May are already
d if their eggs were set now the
vould bring large prices as spring
n March. The "La Bresse" breed
rdy and precocious, but I cannot
r of my readers to set the eggs of
reve Cœurs" or "La Fleches" till
oonest, and only then if the frost has
ound. A very interesting show of
as held in Paris in 1865, not for
al fowls, but for fat ones killed and
r cooking. The "La Bresse" breed
f the "prize d'honneur," closely run
Houdan." Both are remarkable for
of bone, plumpness, and whiteness of flesh. The latter reminds one of the once famous but now all-but-extinct old Scotch breed, the "Chick Marlin." In colour they are very similar; but as egg-producers the French breeds must have the *pas*. I hope to see prizes offered at our agricultural shows for the best table poultry of any distinct breed—not alive, as we have sometimes seen, but ready for the spit and prepared artistically. The French pay more attention to this than we do. No fowl can make a good appearance on the table if badly trussed. Seldom do we see this attended to. It is not difficult to learn the art, and yet how often are chickens, that in able hands might be made to assume a respectable form, presented to us sprawling on the dish as if in agony, their poor sharp breast bones sticking up to upbraid us for our want of attention and "good guiding." In France the combs of cocks are considered a delicacy, and sold separately; the giblets, too, are always set spart. The French, as a rule, consume far more poultry than we do; and even after supplying their own great demand, the exportation of it to England forms one of the principal sources of wealth.

DAILY FOOD IN FRANCE.

The fattening of fowls is carried on to a great extent in France. In some localities it is the staple occupation of the females. In three weeks after being penned up the birds should be ready for market; but they must be in fair condition when cooped, and not more than six months old. Cockerels do not fatten so well as pullets, but if they have been kept apart, the young male birds of all the

French breeds are very superior in flavour and delicacy to the Dorking, and must not be despised as table fowls. In France the food given is buckwheat ground into meal and mixed with milk. Barley and oatmeal, and also Indian corn meal, are all good feeding stuffs. Great cleanliness is imperative, and to ensure this in the coop there should be no bottom, but merely rounded spars; the coop being on legs, is raised above the droppings, which must be removed daily, and sawdust sprinkled underneath. The chickens should be fed twice in the twenty-four hours, early and late, the feeding-troughs taken away after each meal, washed and kept sweet, as fowls will not thrive if their food is sour and dirty. Milk may be given as drink; it is supposed to whitten the flesh, and certainly it assists in the fattening. Rice boiled in milk forms a very delicate food, but it is not so fat-forming as the meals before mentioned. Suet, molasses, &c., are often given to produce fat, but it is of too rank a nature to please those who are connoiseurs in poultry. Pure natural food must be best, and no other can be recommended. The feeding house must be kept warm and quiet, the fowls themselves being quietly and carefully treated. In my own establishment fattening is never required; the fowls are fed up from the shell for exhibition, and therefore are always fit (after a fast of twelve hours) for the table, the only risk being of their becoming too fat for laying purposes and successful breeding.

THE HENWIFE'S KALENDAR FOR JANUARY.

GENERAL AND INTRODUCTORY REMARKS ON CARE OF POULTRY IN WINTER.

BEING originally from warm countries, heat or rather warmth is indispensable to poultry, both as regards the growth and fattening of birds for the table, and also for the production of eggs. This condition of their prosperity was obtained in the long days of summer without any care on the part of the henwife; but now that the genial weather has gone, and that cold and bitter days and frosty mornings and evenings replace them, the warmth spontaneously obtained in summer must be supplied by other means. Then the animal food which was so plentifully obtained in the fine season in the shape of worms, flies, and insects of all sorts, cannot now be had, and the want must be made up, if we would have our baskets filled with plump and beautiful eggs. Cleanliness is another condition without which fowls cannot thrive; and for this they have abundant opportunity when roaming at large in the summer heat. Whoever has watched their habits, must have seen how they take advantage of every heap of earth or ashes within their reach, how they scrape and roll themselves about in it, revelling, apparently, in the delight attending that cleansing bath, to which the sure guidance of instinct directs them. And should no dust-heap be near, the smallest spot of earth on the borders of their pen will be noticed, and they may be seen scratching, and scraping, and rolling, until a bath of sufficient size for their purposes is made, in which they perform their toilet with a scrupulous care, which might put to shame many an unfeathered biped. The thoughtful henwife, then, will mark the varied circumstances of her charge, and carefully supply their now increased and increasing wants in such a manner as to make the curtailing of their summer privileges as little felt as possible. And first, as to the loss of the warmth of which they are so fond, and which contributes so much to their health and comfort, we would recommend that the deficiency be made up by an additional supply of food of a more nourishing quality, and given moderately warm. In the summer months, when the fowls leave their roosts shortly after dawn, it is usually found convenient to give them dry for their first meal: it can be left in ard the previous evening, unless the e happen to be an unusually early But in winter, we would recommend eir first meal be a warm one; it sets p, and makes them comfortable for the d, besides, promotes laying. As they d later from the roosts in the short heir food can be prepared without in- ience to the henwife or her assistants. ixture we have found to answer best is es boiled very soft, beaten up with (sometimes called thirds or middlings) y pot liquor or refuse bits of suet and hich the kitchen may furnish, seasoned lt. This will be found excellent food, es are unquestionably nourishing, and e bran (sharps) is remarkable for its -giving properties. Barley-dust may stituted for sharps, or what is still half barley-dust and half sharps may l. The raspings of bread, which can from the baker at a moderate price, peck, may be used at times to vary od. One advantage of the bran) is, that it makes the mixture friable, erty which soft food should always anything glutinous, adhesive, "sticky," ld say, is peculiarly annoying to fowls; d this, make the mixture as dry as e. By working it into little balls, a consistency will be obtained, and by ng these balls in their yard, a more distribution of the food will be made y merely putting it in their feeding The sand and gravel they pick up with it promotes digestion. Should chen not produce enough of fat and o make up for the worms and insects in summer, liver may be used instead. tity sufficient to serve a dozen fowls eek may be obtained for a few pence. ter in which it is boiled can be mixed he morning meal, the liver can be d up, and portions of it mixed in the ch alternate day. Some have objected ing the liver, on the ground that fowls ot the worms and insects boiled. In f this, we tried the plan of throwing raw lump in the yard, and allowing the fowls to dispose of it as instinct should direct them. We watched them attentively, but found one and all approach the lump hesitatingly, and turning away without offering to peck, as if moved by an undefinable terror and loathing. We tried it also in its boiled state *en masse*, but found a similar result. The same thing also occurred in putting large worms before the fowls, from which we inferred that, small insects being the natural food of fowls, it was advisable to reduce the animal food given them also to a similar size; and to do this conveniently it must be boiled: so boil it we always have done, and found it to answer excellently well. Salt has also been objected to as being poison for fowls: in large quantities it certainly is so, but if used in the manner and quantity as for the table, it will be found beneficial, as will also a little pepper, in the winter months especially. There should also be placed every morning in the yard a supply of green food—a cabbage, or a turnip, or a beet, whatever the garden can supply—in a raw state of course; the fowls will pick out the most delicate pieces; the head of the cabbage is their favourite *bonbon*. They are fond of green meat; it is good for them; not only so, but it is doubtful, we should say, that they can thrive without it. From the earliest hours of chickenhood, up to their latest day, such food should be liberally supplied. And last, not least, *pure and fresh water* must not be forgotten; it must be renewed daily, and given in large quantities. Innumerable diseases flow from the neglect of this indispensable condition of health, a condition so easily and so cheaply obtained that the neglect of it is quite inexcusable. A covered shed under which to place the food and water, to protect it from rain, &c., will be found highly advantageous; it will also serve as a shelter to the fowls from the inclemency of the weather. Towards mid-day the fowls can have a good feed of dry grain; but should economy be studied, a renewal of their morning meal, with the addition of a small quantity of boiled barley, will be found very suitable. Whatever be their mid-day meal, it is imperative that y have before roosting a small quantity of dry grain—we prefer oats: the warmth which they give prepares the fowls for the long winter night; and if accustomed to this, should they at any time be forgotten, they will be found waiting in their accustomed place long after roosting hours, as if to remind the forgetful henwife of their empty crops.

Those fowls which are intended for sale should be fed more frequently, and larger quantities of grain should be given to them than to the other fowls. Where speedy fattening is required, the following will be found a good plan:—Put the fowls to be fatted into a quiet place, and feed them three times a-day with rice boiled in skim milk till it is quite soft and swelled out. Give each time just as much as will satisfy them, and as dry as possible. Remove the feeding dish each time. Let it be thoroughly washed, that no sourness may be conveyed to the fowls, as that prevents them fattening. Give them the milk of the rice to drink, or a little clean water. It will be found that this method gives the flesh a whiteness which no other food can give; and when it is considered how short a time is required for fattening, it will be found as economical as any other mode, or even more so. In five or six days the fowls will be sufficiently fat for the table. The coop in which they are confined must be cleaned daily, and no food given for sixteen hours previously to being killed. Of course, the fowls must have gained size and flesh previous to being put up, or the process described above will be of no use; and, to avoid repetition, it may here be stated that the same remark applies to every process of fattening which may be recommended n any future part of this Kalendar, as there s no plan that can be of any use to an ill-fed, ll-grown accumulation of bones and feathers, o to speak. Let the chicken be well cared or from its earliest days, have an abundant upply of food and water during the day, and warm, well-aired lodging during the night; t will then gain both size and flesh; and when the period of fattening arrives, it will be easily and speedily accomplished. Besides giving attention to food at this period of the year, the henwife must see
fowl-house be impervious to rain a
free from biting draughts, and otherwi
and comfortable. If placed contigu
stable or cow-house, or kitchen fire,
thus communicated will be found
advantage in winter. The dust-ba
not be forgotten, and be placed eith
fowl-house or in a covered place in t
as, on account of the frost and ra
may now be expected, we cannot c
on the fowls being able to find or ma
as in summer; and without this m
cleaning they would soon become
with the vermin to whose visits, eve
the most favourable circumstances,
at all times subject. A little sulphur s
in their nests, which should be provid
clean straw frequently changed, is
preventive to this annoyance. Th
should be swept *daily*, and the wa
perches occasionally washed with clea
in which a little lime has been mixed
highly desirable that the fowls shou
the benefit of the sun whenever it
For this purpose, their yard and run
have an exposure to the south or so
They take great delight in basking
sun's rays, if we may so speak, and
now seek the shade as they did in
days of July.

Labours of the Month.—Long ere t
the hens have ceased to lay, but the
and Brahmas should still contribute th
to fill the baskets. Still, with the utm
and abundant feeding, the supply will
scanty. There is only one method
we can with any certainty reckon on a
dant supply of eggs, a method which
little known to many poultry keepe
scarcely mentioned in books for the
ance. This method does not consist
peculiar mode of treating adult hens,
extra nourishing food; this, so far from
them more prolific, often prevents then
entirely. We all know the story
woman who, having a hen which laid
egg each day, fancied that by extra
she would get two. We know that, f
this being the case, her hen became
that it ceased laying altogether.

dently, then, while generous and mode- eeding may induce the hen to go on a longer in the manufacture of eggs, over- g has a quite contrary effect, and pre- laying entirely. But, to come to the , the plan to which we refer is—simply e advantage of the natural laws to which are subject. Now, we know it is their e to *commence laying at a certain age*, ver late the season or rigorous the er. Cold, and other adverse circum- es, may diminish the number and size eggs, but it cannot prevent their laying they must, and lay they will when the r season arrives. This season is earlier er, according to the kind of fowl. Co- , if hatched at the time most favourable owth, and if the weather be fine, will ence at five months old—they have been n to do so as early as sixteen weeks old. ings and Spanish hens do not usually till seven months old. Now, by having s so arranged that a succession of pullets e ready to commence laying when the are wanted, a supply may be provided when the adult hens are taking that repose evidently necessary for their future fruitfulness. We do not say that hens never lay in winter—the Cochins and Brahmas are peculiarly winter layers; the Spanish hen, too, frequently lays all the year round; but we do say, that notwithstanding all this, they cannot be depended on to do so. The only certain plan is what we have just stated—to rear a sufficient number of pullets which may begin to lay at the time wanted, and continue to lay during the winter months. With this view, it will be well at this early season to give every inducement to the adult hens to brood. This may be done by placing several eggs, or pieces of chalk made so as to imitate them, in the nest, which must have in it plenty of clean straw or hay. The clucking sound indicates the desire even before the hen begins to sit. Should there be any doubt of her sitting, she can be placed on addled eggs on trial. If she keep close to her nest for a day or two, she may then have valuable eggs given to her.

The Naturalist.

OGRAPHICAL RANGE OF ANIMALS AND INSECTS.

MAURY, in one of his most
ming little scientific works, "Phy-
aphy," gives the following most
notice of the uses and habits of
ects, and even vegetables, in the
nomy of the earth:—

nt, tree, and animal to be found
the three elements, has what is
eographical Range—that is, the
nd which it is death to venture,
which nature supplies all the phy-
ons suitable to its well-being. For
le kingdom, which supports the
se conditions embrace not only
mate, but winds, and sometimes,
-existence of insects, and occa-
n of other animals, whose instru-
required to assist the plant in the
of its species. Were it not for
to fructify the fig-tree, we should
ts delicious fruit; bees and birds
, as they suck the sweets or gather
arry pollen from one flower to
l so to enable certain plants to
Again, there are other plants,
eals, and a variety of others that
farms, and furnish our table with
that, notwithstanding soil and
l all physical conditions nature
would die out and disappear from
the earth were it not for man.
domestic fruits and plants, such
all its varieties, are of this sort.
ly few plants that grow near the
l flourish in the climate of Eng-
unsuited to the sugar-cane, the
the cotton-plant, the date, olive,
. Their geographical range does
o the latitudes of England.

families of insects which subsist on a single plant, and no other; of course, where that plant is not to be found those insects are absent. Nature is said to have quartered no less than forty different kinds of insects upon a single plant, as the common nettle. Of course, then, in countries that lie beyond the geographical range of the common nettle, none of these insects are to be found. Upon certain kinds of insects other insects live, to be preyed upon in turn by beasts, birds, or reptiles, which in their turn, also become food for worms, or are devoured by larger animals. So it is readily perceived, that from first to last, there are myriads of links and thousands of chains, which connect together, bind up, and make reciprocally dependent upon each other, every subject in the two great organic kingdoms.

To each individual, with its family, in these wide domains, whether of the animal or vegetable kingdom, Nature has prescribed duties in her economy, and assigned geographical limits. Only to man, the lord of all, and to the dog, his companion and friend, has she set no bounds, but *given* a geographical range from pole to pole. They roam the earth together, and in company go where they list; where mother earth fails to supply them with the means of subsistence they, with the intelligence of the one assisted by the sagacity of the other, gather it from the air or water wherever it is to be found. This true friend of man, and faithful creature, continually reminds us by its instincts, that it is endowed with certain of them, not only for man's use, but for his pleasure and amusement also. Take as an example the setter and pointer dogs. These two species display instincts which are not used by that animal either in attack or defence, or in the procuring of food.

in the ennobling sports of the field,
m with marvellous relish to his own
and advantage.

is there a vertical as well as hori-
nge for every organic creature under
The inhabitants of the sea cannot
nd certain depths; nor the birds of
beyond certain heights; nor man
the tops of the highest mountains;
vegetation, except such as can grow
der ice or snow, soar as high. As a
temperature decreases 1° for every
of perpendicular height. So that, as
ller ascends a high mountain—such
orazo, for instance, which is upwards
feet high, and is situated near the
in South America—and reaches the
about 16,000 feet, he comes to the
perpetual snow. This line, called
-line, comes nearer and nearer to
e of the earth as you approach the
ntil finally it reaches the sea level in
and Antarctic regions, where the
perpetually frozen. The mountains
d—some of them—are high enough
the snow-line, though the heavy
ion over these islands makes it
n by the rule it should be.

lly, the sea is most thickly crowded
ts and densely inhabited by moving
between the surface and the depth
t. Here the plants, many of which
beautiful in colour and bizarre in
in to disappear. As in the air, so
ean, the animals are permitted to
ider range than plants. Animal
e sea extends to the depth of 1000
some philosophers go so far as to
to the very bottom and bed of the

not until our own day that attempts
matically made to obtain specimens
from the deep sea. The author
od fortune, some years ago, to win
of setting on foot a regular series
a soundings. These resulted in the
of the celebrated telegraphic plateau,
ed in the Atlantic extending from
Newfoundland, and on which, in
elegraphic cable was laid from Val-
reland to Trinity Bay in Newfoundland. It, however, failed to work almost immediately.

During this series of soundings, the bottom of the ocean was tried in various places, with reported depths, varying from 1000 to not less than 30,000 feet; but the deepest specimens of soundings that were obtained came from the North Pacific Ocean, at the depth of a little over three miles and three-quarters (19,800 feet). Whether from the Atlantic, the Pacific, or the Indian Ocean, the Red Sea, or the Mediterranean, all these treasures from "the ooze and bottom of the sea," when placed under the microscope of Ehrenberg and Baily, told the same story; namely, that the bed of the ocean is a great charnel-house, strewed about and covered up, to the depths perhaps of many feet, with the remains of its own dead. Most of their skeletons are mere mites of things, far too minute, as individuals, for the naked eye to comprehend; but, brought up in masses, which the officers took to be mere lumps of unctuous clay, it was more difficult for the microscopist to resolve them, and to make drawings of the shells which they had inhabited. With the remains of these little creatures the Gulf-stream, throughout its course, has strewn the bed and bottom of the Atlantic, dropping them down as gently as falls the snow-flake in a calm. They bear no marks of abrasion, but suggest that at the bottom of the deep sea there is no running water, nor anything to disturb the almost perfect state of repose that reigns there.

The insects—including under this term all that are too small to be recognised as beasts, or birds, or fishes—exceed in numbers all the other inhabitants of the sea, and land, and air; and in all three of these elements, they most abound within the intertropical latitudes. There they fill the air with their hum, and make the landscape to glow and sparkle with fire and flame. At night, as the navigator ploughs through intertropical seas, his keel leaves a broad bright wake to mark its passage, owing to the immense multitudes of phosphorescent animalcula it has disturbed in its silent path. And, when the sun sets upon intertropical America, where insect life most abounds on land, the forests and plains resound with their hum, that is said to have been heard by mariners several miles out at sea. There, too, the curtain of the night is spangled with the most glittering jewels of the insect world. Fireflies, bearing their green, red, and white lanterns, and shewing them now as fixed, now as occulting lights, cause the darkness to glow and sparkle again with brilliant and countless flashes. On certain occasions, the ladies in some parts of South America deck their hair and ornament their dress with a particular species of these luminous insects, in preference to jewels. In Brazil the insects present the most brilliant and beautiful colours, surpassing even the plumage of the birds and flowers—gorgeous as these are. Persons there support themselves by catching these finely-coloured insects, and making of their shields, wings, and legs, artificial flowers of the most exquisite elegance, taste, and beauty.

There are said to be no less than 300,000 kinds of insects that are already known; and when the physical geographer learns that these creatures most abound in intertropical America, he need not be told that there the powers and wealth of the vegetable kingdom are displayed in greatest variety, profusion, and glory. Small as these creatures are, and individually insignificant too, we must not regard them as of no use in the world. Every family of them has no doubt its work to perform in the economy of nature. We may not discover what is required of each particular tribe, but we see the work of many of them, and in such cases we are left in no doubt as to the part borne by them in making the face of the earth what it is. We have seen the little coralline building up islands in the sea, and we may now behold these islands as the scene of many a happy abode for man. If we look at home, we may see another of the numerous cases in point that could be named, and which is afforded by the common earthworm. One of its offices in the physical economy seems not only to be to make the soil fertile, but to help also to keep it [illegible] cultivation. It bores through the rich earth, and, in doing so, makes it only more permeable to air and water, but it passes bits of the soil through its own intestines. In this process, the productiveness of the land is greatly increased. Every particle of the soil in these realms has, from first to last, had its fertility increased by the labours of this crawling thing.

Insects are often of the most tender and delicate structure. They cannot endure extreme vicissitudes of climate. They burrow in the earth or hide in the bark and wood of trees to escape the frosts of winter. Indeed, high mountains, on account of the low temperature of their snow-clad heights, seem to present impassable barriers to most of the insect tribe. Hence the marked difference often observed in the insects on opposite sides of the same mountain range.

All the larger marine animals of the Northern hemisphere are said to differ more or less from their congeners of the Southern. To those of the extra-tropical regions the equator is as a sea of flame which they cannot pass. The right whale of the Northern hemisphere differs in its physical aspects from his fellows of the Southern hemisphere. He cannot pass to them, nor they to him. Those of the North Pacific and North Atlantic are alike. It is the practice of whalemen to name and date their harpoons; and many years ago a whale was captured in the North Pacific, in which was found, when he was brought to the "winding tackle" for "cutting in," an iron that was thus known to have been thrown into him off the shores of Greenland. Now, since he could not cross the equator to pass either Cape Horn or the Cape of Good Hope, and so enter the Pacific, the inference was that he must have come through the Arctic Ocean, and thus we had one of the first practical indications as to the existence of the famous North-west Passage.

Attention may be here called to the fact, that the sea is without music. To none of its inhabitants has the voice of song been given. The same remark applies to the beasts of the field and the reptiles of the earth. They hiss, they make a noise, they utter their sounds—those that have voices—either in the tones of anger, affection, or complaint. The gift of music and the faculty of song appear to be peculiar almost to the bipeds—to man and the birds.

The Country Gentlewoman.

ON HOUSEHOLD SERVANTS AND THEIR DUTIES.

BY THE LATE MRS PARKES.

CONDITION OF DOMESTIC SERVANTS.

DOMESTIC servants are a class in society no less essential to its welfare and convenience, than the equivalent in subsistence and money, which for service done that class receives, is essential to the well-being of each individual belonging to it.

In no era of time, nor in any state of social life, has man been able to dispense with the aid of his fellow-creatures without losing ground in his progress towards civilization. Mutual assistance, co-operation amongst men, is the impetus to social improvement—the promoter of social convenience. So great has the necessity for it ever been, that in countries and in periods in which this could not have been the effect of mutual compact, the stronger members of communities imposed it by force on the weaker; and hence the origin and wrongs of slavery.

Very different is the condition of domestic servants at the present time, in most parts of the civilized world. It is respectable and creditable. It has its rights, its privileges, which give it a character of independence, notwithstanding the term "service" attached to it. Public laws protect this class of British community from injury and oppression, and the prevalent domestic regulations and habits all tend to secure to it every requisite comfort, and, even more, much enjoyment. Independence, like happiness, is always comparative. There is no class of society but has its power "to will and to do," restricted variously, and in different degrees. Each class and each individual composing it is under subordination of some kind or other; and each acquiesces in its necessity, on perceiving it to be based on principles of general utility and security. When subordination is so based, society must be both generally and individually benefited. Without it what would be the state either of public or private life? The struggles and contentions of ungoverned passions, the clashings of different interests, the wilfulness of the powerful, would assail and overcome all the quiet and peaceful influences of domestic life, and be in perpetual opposition to the order and justice by which society is held together.

Hardships, and the loss of independence, can scarcely be considered as characterising, in this country at least, the state of domestic service. If deficient in personal freedom, it is exempt from great anxieties and responsibilities; and in admitting of change from one service to another, it fetters no individual to the permanent endurance of trials peculiar to any one situation. It compels no one to any devotion of his strength, nor to engage in any excess of duty beyond that which, on entering a service, he voluntarily, and for a stated compensation, engages to perform. It does, indeed, require from him a diligent and faithful attention to the duties which he has undertaken; a strict regard to personal decorum, and to the moral obligations of temperance and honesty. Trials of patience and temper he may experience; but not in a greater degree, probably, than his superiors may have, in their sphere, to encounter.

The principal of a family has a right to prescribe certain regulations, by which his servants are to govern themselves. There can be in different families no complete uniformity in these domestic regulations, while there is neither uniformity nor equality in the circumstances and characters of those who form social communities; in every household, some variations of habit and custom mu be expected; and servants, entering new situations, will be disappointed if they expect to meet in each a counterpart of those which they had left. They must conform to each variety, or submit to the penalty of frequent dismissal. There can be no proper notion of domestic subordination, when a servant permits himself to reproach his employer, and which is not unfrequently the case, with some such expression as this: "I have never been used to that," or "that work did not belong to me in my last place." Neither has he any right to object should his master prescribe the mode in which he is to perform his business; and he is especially blameable if, at the same time, he impertinently retorts, "I know my business, and am not come here to learn."

In describing the course of domestic business, the object herein is not to mark the limits of each servant's province, as if he was not subject, in the main, to the wishes of his master, or to the convenience of the family whom he serves; but governed, as it were, by prescriptive regulations, to which, as a code of domestic laws, he may appeal for his justification when inclined to disobey orders given him. On the contrary, the intention of this article is, after setting forth the condition and usual treatment of servants, to present a manual of domestic knowledge and of household practice, to which inexperienced housekeepers and servants may alike refer, when seeking to know the details in each branch of household duty, and the mode in which, in all general cases, household work is distributed throughout the establishment.

The suggestions and details thus brought together may be respectively useful to master and servant, without affording pretext to either for the omission of any part of their mutual obligations, or for any breach in their mutual compact.

QUALITIES OF SERVANTS.

In servants generally, we look for the essential qualities of integrity, sobriety, cleanliness, and general propriety in manner and dress, together with the knowledge of the duties in their respective departments of household business which, on being hired, they professed; whence, besides these indispensable qualities and powers, some few members of large establishments should, in order to be competent and effective, have other distinctive marks of fitness for the office filled.

A *house steward*, for instance, the chief member of the establishment, holds the most responsible of the household offices. Of him, as the representative of a higher domestic authority, we would remark, that he should, in some measure, manifest qualities similar to those possessed by him whom he represents. Any one having authority over others should have *self-command*, to enable him to meet, without forgetting himself, provocations from the unruly or insubordinate members of the establishment. He should possess *firmness* in enforcing all reasonable performance of duty; he should have *integrity* beyond the powers of any one to induce him to connive in deviations from duty or honesty; with these qualities, he should demean himself in such a manner, that none in the subordinate departments of the house should be on such familiar grounds with him, as to diminish his authority or influence over them.

A *butler* is sometimes similarly situated with the house steward, and is hence called upon to exercise similar qualities with those above mentioned.

The *housekeeper*, whose place in the female part of an establishment is similar to that of the house steward among the men servants, should possess the observation and vigilance of an active mistress of a family. Her eye should never be withdrawn from the circle of her duties; in that she should be ever ready to act with the decision, keenness, and interest of a principal, maintaining over the subordinate actors in it a strict but not severe superintendence. Those whom she has to direct, and to keep in a regular discharge of duty, are like children, requiring a firm mind to govern them, a quick apprehension of their dispositions, so as to apply to each an appropriate stimulus to good conduct; and a kind disposition, to afford them comfort and consolation when ill, or in sorrow. To sum up the characteristics of a good housekeeper, ld display a propriety of manner ertinence would not dare to attack, tegrity of conduct which malignity impeach.

lady's-maid and *valet*, both stand- milar grounds, prudence of speech long. It would secure them the e of their employers, and save them inconvenience and trouble in which tattling would involve them. Being nediately about the person of those y serve than others of those whom e than others of the establishment, opportunities of hearing opinions ns and circumstances, hastily and dly expressed, which, if repeated, mischievous, especially if told inac- or with exaggeration. In these two of the establishment, it is also appa- uniform neatness and cleanliness of with order in their habits, and the f controlling their tempers, are requi- ities.

head nurse, the qualifications which to be requisite or desirable are so s as scarcely to be found united in ividual. Fitness for the important nurse must be found in a union of and powers, both natural and ac- In person, a nurse should have no peculiarity or deformity. No habit- s with the features, such as squinting aces; no defect in the articulation, lisping or stammering; no singularity rity in the tone or accent; for such ities always bring into exercise the e propensities of childhood. In sta- middle size is, for a nurse, preferable r extreme, of tall or short; the one using deficiency in activity, the other cular power. The constitution of a aid should be sound. Tendencies to s of any kind, to consumption, to tism, or even being liable to frequent hes, would detract from the personal of an individual for the duties of the . In age the nurse should be neither d nor very young; were she old she possibly be very deficient in activity nper; were she too young she might want consideration and judgment. In disposition she should be cheerful even to liveliness, yet withal gentle. Boisterous gaiety in the nurse would be almost as injurious to her infant charges as a temper of irritability and violence. In the situation and duties of a nurse there is much to try the temper; and it is not reasonable to expect that it should be always unruffled; still no one is fit for the charge of children who cannot control in herself any violent expression of irritation. In personal habits the nurse should be scrupulously correct. Cleanliness and neatness are not to be dispensed with in the individual who is to lay the foundation of good habits in the objects of her superintendence. Deficiency in such habits can, in her, only arise from indolence; and, if this defect be inculcated in childhood by the force of her example, it may, being the parent of so many other vices, blight the promise given in the first years of life of the exercise of future mental vigour. But after all, no personal nor acquired qualification in the nurse can be put in competition with the all-important requisite of vigorous, effective, and virtuous principles. Neither deformity in person nor singularity of speech or deportment can inflict, on an infant generation, an injury equal to that which a vicious influence in the nursery can effect. The art of deception and craft manifested there have often sapped the ingenuousness of the most guileless nature that childhood had ever evinced. Such evil once effected, and thus early in life, all hope of honour and integrity being manifested in manhood must be abandoned. A head nurse, besides being herself scrupulously upright in conduct, should be acutely alive to all habitual deviations from rectitude in the conduct of those employed as her nursery assistants. Should their faults, after a fair trial on her part, prove incorrigible, she should not from false feeling screen them from detection, but rather should openly and decidedly make them known to those authorized to dismiss them. Their occasional omissions of duty, together with many of the inadvertent errors of youth, may and ought to be treated leniently, if not entirely overlooked; but any systematic deception, habitual indolence, and violence of temper, any one of which defects would render their example dangerous in the nursery, it is her decided and peremptory duty to expose. If her employers retain them after knowing their defects, her responsibility as regards them ceases; but as long as she conceals their misdemeanours, she makes herself answerable for the consequences. Let her keep always in mind that although the conduct of a junior servant may not be as well regulated as that of one who has passed through the discipline of years, yet that it is part of her duty to see that no one over whom she has authority neglects to perform her share of work with neatness, cleanliness, activity, and good humour, nor sets any evil example before those whose infant propensities would render ready imitators. A nurse who acts thus would be entitled to no common share of respect and gratitude from her employers.

Foot-boy.—Of all the subordinate members of an establishment, such as foot-boy, scullion, &c., the good qualities to be sought for in them are of an invariable nature. No one would, knowingly, engage in their service those whose characters could not stand a strict investigation as to honesty, sobriety, cleanliness, activity, and civility. Possessing these qualities, the duties of these inferior members of establishments are so much under the superintendence of those above them amongst the household, that they are on the footing of learners rather than of able assistants in domestic business. Their fitness for the departments they fill must be sought for, more in the qualities of which they give indications, and in their promise to improve, than in their efficiency as servants.

CORRUPT PRACTICES OF SERVANTS.

Corrupt practices of servants, which are not unfrequent, must here be noticed as warnings to their employers; in whom such practices are discovered there can be no confidence, for they betray the want of some of those requisite qualities above enumerated. The consequences of such low-minded trickery of which we are about to speak recoil upon servants generally: the good suffer with the bad.

In a household, every instance of pilfering and trickery accumulates odium on the whole class, and makes it individually watched and suspected. The prevailing bad opinion of servants inflicts, too, an injury on the employer and employed; a suspicious temper being as unfavourable to the character of the one as to live suspected is to that of the other. Yet that there is sufficient ground for suspicion must be allowed. It is every day acknowledged that one of the main anxieties of housekeeping is the apprehension of the dishonesty of those who are under our roof and receiving bread from our hands; it is this insecurity which often destroys repose, and undermines a generous and confiding temper. Were the depredations of a description to be easily detected, the annoyance would be of less moment; but they are usually so systematically small as to defy the strictest scrutiny to discover, and yet so uniformly carried on as to be in the end incalculably great.

Of these practices, that of connivance with the servants of the tradespeople employed by a family is one necessary to be known, as the remedy is evident, provided the practice be confined to the servants, and not to the tradesmen themselves. It is that of entering into the books more goods and articles of food than are brought into the house, the amount of which is divided between the cooks and the agents employed by the tradespeople to convey their commodities from their shops to their customers. So prevalent has this malpractice been as to give origin to slang epithets; for instance, the loaves added to the amount of those actually taken into a house are called *dead men's loaves.*

It must, however, be remembered, that if the payment of the baker's bill be not settled between these dishonest parties, they can derive no advantage from the fraud, and will therefore have no inducement to practise it, unless the baker himself also connives.

Against cooks, charges have been often substantiated of other ways of disposing of

rovisions of families which they serve.
indisputable that a traffic is carried on
any cooks with their own needy con-
ns ; and from the discoveries which
been frequently made has arisen the
of exclusion from every house of the
s and relatives of servants in the metro-
—an indispensable restriction, unless the
ls are almost as well known to the family
e servants themselves. In all great
petty depredators have so many means
ading discovery, as to render them the
dangerous.

paying bills, dishonest servants find an-
means of emolument to themselves at
employers' cost; and in which the
people certainly do connive, probably
e object of keeping in favour with those
if so disposed, might injure them with
customers. It is no uncommon practice
cook, on entering a new service, to make
for herself with the tradespeople
family, and if they prove unbendingly
t, she has no resource but to decry their
, and thus lessening their estimation
their customers, induce them to deal
ere, and perhaps with persons of her
tamp. One of her claims is to the odd
and halfpence of each small bill, and
discount upon large accounts. Christ-
oxes are, also, generally demanded by
ts from tradespeople. All these sources
et gain must, it is apparent, spring pri-
from the principals of families, and not
he tradespeople who, in affixing a price
ir commodities, must take into account
se drawbacks upon them, or their busi-
ould not prosper. These facts do not
doubtful authority, but are indisput-
nd illustrate the importance and econo-
the habit of each principal settling his
ills, and allowing his domestics to have
e concern with his tradespeople as pos-

honour which servants pretend to pre-
amongst themselves, and which pre-
them from exposing the frauds and mis-
ct going on amongst them, is only an-
ame for deception and dishonesty. An
-minded servant ought to distinguish between the pettiness of tattling and the duty he owes to his employer and himself; and it should always be impressed on his mind that to see dishonest practices and not to disclose them to the injured party is to participate in them. He becomes [an accomplice, if he knows of frauds and is silent.

HOUSEHOLD REGULATIONS.

In the following details will be found the regulations now generally, though variously, modified, by which the treatment of domestic servants is governed:—

FOOD OF DOMESTIC SERVANTS.

The food of domestic servants is uniformly at the cost of the principals of families, though, in different spheres and houses, there are different modes of settling this part of domestic management.

One, and the most general plan, is to have meals prepared for the household distinct from those of the family, at stated and early hours, and consisting chiefly of plain substantial fare, with specific allowances of beer and ale.

In this country, but only in families of the first rank and greatest affluence, there are two distinct tables allowed in the establishment: one in the steward's room, for the chief members of the establishment; the other in the servants' hall for the rest of the domestics.

The steward's table has been of late years less frequent than formerly in the houses of the great. During the long war of the last century, provisions became so immoderately high, and every luxury so heavily taxed, as to induce in most houses, where large establishments were indispensable, great retrenchment in whatever way it could be effected; and the first steps taken by many of the gentry was the abolition of the steward's table, only one general table in the servants' hall being thenceforward allowed to the establishment.

Where the steward's table is yet extant in the houses of the nobility, the house-keeper and house-steward preside at it, and none of the domestics but lady's maids, valets, butlers, and head gardeners are admitted to it.

In the house-keeper's room, the same party take their breakfast, tea, and supper, at the last of which the head nurse has a place, when she can leave the nursery without neglecting her charges.

The meals in the servants' hall are usually announced to the members of the establishment by the ringing of a great bell. It is rung at 8 o'clock in the morning for breakfast, at half-past 12 or 1 o'clock for dinner, and at 8 again for supper. In large establishments, where many are to be served, an hour's time is allowed for dinner. In establishments of smaller number, half-an-hour is allowed for dinner, and half-an-hour also for tea and supper.

Breakfast and supper for men servants consist generally of bread and cheese, occasionally of meat, together with a pint of beer to each. Generally speaking, meat is allowed to establishments only once a day.

The consumption of food sufficient for each domestic has been calculated to be at the following rates:—

Allowance of bread for men servants, two quartern loaves each, or 8 lb. per week; for women servants, one quartern, or 4 lb. each per week. Allowance of butcher's meat, half a pound per head for each day's dinner for females; three quarters of a pound for men. Allowance of cheese, one quarter of a pound per week for each individual. Allowance of butter, if fresh, half a pound per week for each servant, or if salt butter be used, three quarters of a pound. Allowance of tea, half a pound per month for each servant. Allowance of sugar, half a pound per week. Allowance of beer, for the men, a pint at each meal; for the women servants, half a pint at each meal.

Board wages are, in some houses, given to servants instead of food. Some regard this mode as economical, and as diminishing the trouble of house-keeping. But others consider it as a mode full of temptation to petty thieving in servants scarcely to be resisted, and hence its evils are greater than its advantages.

For servants left in houses when families are absent from home, board wages form both a proper and convenient mode of fulfilling the master's obligation to provide food for them.

Board wages for men vary according to the circumstances of the family paying them, from twelve to fourteen shillings per week; for women, from eight shillings to twelve per week. Servants living on board wages usually club together, and appoint the cook of the family to be their caterer; or, in some cases, the cook contracts with the rest to provide them at so much per head their dinners and suppers. A third arrangement is sometimes adopted. Food generally is provided for the establishment, but money is allowed each servant to provide for himself beer, sugar, and tea. For beer the allowance in money is two shillings per week for each man servant, and one shilling per week for each female servant. For tea and sugar some families allow one pound per annum to each servant, others two pounds. Of these modes the principals of families adopt that which to each family respectively appears to be most convenient or economical. Servants have no choice in the matter, further than that of declining to serve in families where arrangements of this nature appear to them objectionable, or not conducted in a manner likely to promote their daily comfort.

The meals of servants in small families, and of limited means, generally take place immediately after, and upon the remains of, the family meals. In such cases the hours of the family are early and regular, or the arrangement would prove uncomfortable and injurious to the health of servants, whose constant active employments render regularity in their meals of great importance to them.

ENGLISH AND AMERICAN SERVANTS.

merican, writing anonymously, has tely been giving to the world a " English Photographs," and among the two following of English and n servants, in which the habits of pretty faithfully portrayed :—

ENGLISH SERVANTS.

nglish have too many servants. The divided into very small portions, and st be a man or a maid for each por- utler, housekeeper, cook, housemaid, naid, nurse, nurse-maid, laundry-maid, aid, footman, valet, scullery-maid, and " buttons," they muster in a diversi- formidable array, and each one is by some secret bond of the frater- er to do anything that is assigned by to the departments of his coadjutors. three or four servants must be to a moderate household in London. ountry I have known fifteen servants to wait upon a family of four persons. t speak of noblemen's families, for aintain an immense retinue of depen- d underlings, but of a quiet country- ith no game preserves to look after, stud of hunters to require extra en. English ladies are, as a rule, ousewives than American women, and ve need to be so. To manage so *nployés* satisfactorily demands talents, and experience enough to fit a man rank of drill-sergeant, or even that of In many English houses the ser- orm a household within a household. nust have a separate table, not fur- forth with the funereal baked meats eir master's feast, but with everything specially. Even in the plainest there is a fixed extra allowance for ants' beer. In great houses the upper s have a third table in the house- s room. All this draws heavily upon the income of the head of the family. Wages are not very dear, but not much cheaper than in America. Perquisites are about the same in both countries. Vails, or gifts from visitors to servants, are not thought of in America; but in many parts of England the custom is still continued in all its antient force. During the dull season last summer, there was a determined attack upon it in the newspapers, but very little effect was produced. Gentlemen furnished statistics to shew that it would have cost them less to buy their own shooting-grounds than to accept invitations from friends and pay pounds to the gamekeepers. Other gentlemen ciphered up the amount of money of which they had been mulcted by the understrappers at houses which they had honoured with visits. The journals, in long, logical, and learned leaders, protested against such impositions upon guests. But when the servants, aggravated beyond endurance, at last rushed into print, and, with homely pathos, but bad grammar, recorded how much extra work the visitors made for them, almost everybody felt that the servants had the best of the discussion. At any rate, to tip the English servants is the custom, and Americans should not venture upon an exception. It is impossible to offend any Englishman of what are called here "the lower orders" by offering him a shilling. From the policeman who points your way to the page who ushers you into a drawing-room, they all have itching palms. In any other country you can ask a question of a street-loafer without being solicited for "the price of a pint of beer;" but not in this. Nowhere else is poverty so very hard and so utterly shameless. Even in Spain and Italy the beggars are too proud to ask for alms if you address them politely.

AMERICAN SERVANTS.

One pregnant advantage that the English

have is that their servants are their own country folk. A native born American servant is almost an impossibility. In old times we used to find them in some of the Eastern States, but they were chiefly farmers' daughters sent out as "helps" to neighbours, in order that they might learn housekeeping, and so fit themselves for becoming industrious wives. This is the reason why they were called "helps," and not servants; for being of the same social rank as their employers, there was nothing servile in their occupations. Naturally, the same term came in time to be applied to all servants; but it is now very seldom used. The servants in America, then, are all foreigners—Irish in the east, Germans in the west. English and Scotch servants are more scarce, and always sure of commanding better places and higher wages. Germans are preferred to the Irish, because they know more about domestic duties, and are generally neater in their appearance. They have, however, propensities for lager-beer, lovers, and waltzing at late balls, which test the temper of the most patient mistress very severely. The Irish go from the emigrant ships to the "intelligence offices," or servants' agencies; and often they have places—that is to say, are hired—next day after they leave shipboard. Poor girls! The wonder is, not that they know so little, but that they learn so quickly. Coming from homes destitute of every comfort—from straw-thatched cabins, where the only housekeeping consists in piling peat upon the fire—from hovels, where all the meals are cooked in the same pot, and gaunt poverty casts its curse upon the scanty fare—they are transferred in a moment from the horrors of the steerage to what seem to them palaces, and are transformed in a twinkling from emigrants to "culinary *artistes*," or "first-class general servants." They have never had any money before, but they are too shrewd to squander their large wages. With a generosity to which one cannot do too ample justice, their first thoughts are for their poor relatives in Ireland; their first savings are sent to bring these wretched sufferers to the promised land. These Irish servant-girls, whose devotion to their religion shames many a Christian in higher stations, subscribe immense sums of money for the Roman Catholic Church, for the support of priests, and for charity. They have always a trifle left, too, for Fenianism or any other "ism" that assumes the garb of the champion of old Ireland. Thinking of all their devotion, and their patriotism, and their sacrifices, their faults appear trivial; but they have most vexatious faults. They soon learn their independence; their self-respect takes the form of unbridled insolence; they are, almost without exception, virtuous while in service, but they are very fond of drink; they assume unservantlike finery, despise those caps which English maids wear so jauntily, and make frequent drafts upon their mistresses' wardrobes. Cousins are always coming to see them; and as every Irishman is their cousin, a thief or a burglar often turns up in a well-regulated household. Funerals are their delight; and as some Irish friend is always dying, and as they are invited to every wake, a considerable portion of their time is devoted to the dead rather than to the living. They domineer over the real mistress of the house, order her out of the kitchen, and give her the full benefit of a temper spoiled by early brutality. They reserve all their affection for their own country people, and never have the slightest attachment to the families with whom they live. Regarded philosophically, they are excellent patriots; but regarded practically, they are very bad servants, in every way inferior to those of England and Europe.

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FEBRUARY 1869

CHAMBERS OF AGRICULTURE.

THESE bodies were established in 1864-5—years when there was a large excess of national income over expenditure at the disposal f the Chancellor of the Exchequer, and when reduction of taxation was made on almost every article in common use, excepting British agricultural productions.

The oldest, the Scottish,* is now about hree years of age. Their origin, we need hardly say, was mainly agricultural, as this is not only foreshadowed in our heading, but the real or assumed name by which they are described is familiar in the mouth of every public man and farmer in Great Britain.

Chambers of Agriculture were established, because Farmers' Clubs and Agricultural Societies, proper, prohibited, by their rules, any reference to subjects which had a Parliamentary or political character or strain in hem. This sentiment has been expressed in various ways a thousand times, both before and since the institution of Chambers of Agriculture. So far, therefore, our position s understood. Chambers of Agriculture, then, are politico-agricultural associations, and as Farmers' Clubs and Agricultural Societies hold their ground pretty well, and Agricultural journalism has not been altogether deprived of its occupation, the assumption is, that in a great many of these Chambers "practice with science" is subservient to politics.

But what is the banner or flag which the Chambers of Agriculture have raised as the standard they mean to rally around and defend? Or have they in reality raised a standard at all? It is related of a devoted patriot, in the character of a marine, that when he and his wife were on the other side of the English Channel, and there were premonitory symptoms that his first-born was hastily coming into the world, he stretched the Union Jack over his spouse, while she was "in the straw" on foreign soil, that his heir apparent might be born and suckled under the British flag. Are some of the authorities of the Chamber of Agriculture familiar with this incident in the history of one of our devoted "tars," and are they so enamoured of his love for king and country, that they have become enthusiastic imitators—so far as a transition from war to peace will allow—by spreading over their first-born issue the well-known flags which have long been raised by Farmers' Clubs and Agricultural Societies?

Not many weeks since, we were present at an Agricultural Society's dinner, in the heart of England, and a popular M.P., and candi e for being again returned for the coun rose to return thanks for the toast, the "House of Commons." He began with the confidence which belongs to experience acquired in Parliament, and the knowledge or belief that his agricultural audience was hushed by anxiety to hear his view on the points which had been avowedly taken up under the special care of Chambers of Agriculture. After the usual preliminary return of compliments had been hurriedly overcome, he came to the texts with which he had specially primed himself:—"Who is there who would have the effrontery to stand here," he continued, "and say the British Parliament has done justice to the British farmer?" "No politics," timidly exclaimed a political opponent, not twenty seats from the chair. "No politics! No politics!" shouted a dozen farmers, when they saw which way the wind lay with their landlord and squire. "What is the malt-tax?" The speaker again began. "No politics!" was again shouted in several places. "What is the Metropolitan Foreign Cattle Market Bill?" (Hear, hear, cheers, and "No politics.") "No politics!" repeated the speaker with heartfelt surprise, and was pulling himself together for his defence, when the secretary to the society rose and addressed the chairman, saying:—"My lord, allow me respectfully—respectfully to inform—respectfully to inform Mr —— that the first rule of this society is, 'No politics shall be introduced into its discussion under any pretence whatever; therefore, I trust, my lord, this wholesome rule will not be broke." Mr —— was too familiar with the rules of the society to require more than this reminder, and instead of giving vent to his enthusiasm respecting the pending election, in a response to the question which had been raised by the Chamber of Agriculture in his own county, and by his own constituents, while he was doing heavy work in Parliament, he turned as flat as soda-water with the "beads" off, and jumbled out something, during five minutes, on manures, mangolds, turnips, cabbages, and carrots, about which every farmer present knew more than he did.

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* This Chamber of Agriculture, is in many, and these most important, respects very different in construction and in its mode of working from other Chambers, to which exception may be made. We would note, for example, as an illustration of the highly useful objects which it has in view, the elaborate inquiry made into the Pleuro-pneumonia cattle disease. A most extended investigaticn was made into this, and the opinions of the leading veterinary authorities in the United Kingdom were taken, and the whole embodied in a Report, which has been circulated among the members, and is, we believe, about to be published for the general benefit of the agricultural community.

Is there not in this somewhat long digression on a common occurrence a lesson for the authorities of Chambers of Agriculture? Is it not shewn what a fine field there is open for them? And is it not an indication that if they should ever so far succeed as to get a few hundred landlords and tenant-farmers together, and some persistent enthusiast begins to talk about hedge rows and his favourite modes of cultivation and sowing, that the compliment will be returned and he will be interrupted with cries of "No agriculture!" In other words, are Chambers of Agriculture politico-agricultural institutions or not?

What are the facts, both in regard to the past and present? What have Chambers of Agriculture discussed that Farmers' Clubs could not have done without stretching their rules? Or what has been done that correspondents and editors of agricultural journals have not done with more liveliness and point? Are we to accept Mr Acland's nine points of the Chambers as a fair and full indication of their duties? Mr Acland, M.P., is some authority, as he, last year, we read in an official publication, "introduced the subject of a Government Department for Agriculture, for the first time in a formal manner, before the House of Commons." From this we may infer that his opinions are matured. But what else are we to infer? These nine points of the Chambers, as collected, digested, and reconstructed by Mr Acland, M.P., are worthy of repetition. In a letter, last April, to Lord Fortescue, Mr Acland thus promulgated his nine points:—

1. The whole system of inland communication by road as distinguished from railways and canals.
2. The extension of cheap railways into agricultural districts where railways can only pay indirectly, as a permanent investment, to those locally interested.
3. The better arrangement, with a view to local convenience, of the districts into which the country si now divided for poor relief, highways, administration of justice, assessed, and other taxes. Under this head may be included the rectification of parochial boundaries.
4. The management of entire river basins, incorrectly called by some persons watersheds; (*a*) With a view to drainage and irrigation. (*b*) For the better application of town sewage. (*c*) As a matter of health in town and country. Under this head would fall the mode of dealing with vested interests in mills and navigation; also, the complicated systems of sewers management under local acts or customs.

ıe operation of the inclosure commission and
d copyhold commission.
ıe operation and powers of speculative com-
for the improvement of land, formed under
Acts of Parliament.
ıe regulation of markets, weights and mea-
nd statistical records of prices, and other agri-
. facts.
he improvement of the veterinary profession.
he improvement of the technical education of
; concerned with land.

his be all that Chambers of Agriculture
to do, why divide the agricultural
st into "Clubs" and "Chambers?"
s designedly constructing two stools for
ıg to, the general result of doing which
l known. Farmers hitherto have not
clever at organization. Are not their
ıed leaders now doing that which must
their public demonstrations less effec-
But let us turn to another authority,
:entral Chamber, as set forth in their
tioneering address" to "fifteen thousand
›ers in sixty-seven Chambers and branch
ıbers." This address we find was signed
: chairman, vice-chairman, and secre-
What subjects did they nominate last
›er for tenant farmers to pin on questions
ıdidates? In number they were seven,
-

ˌafety markets for imported animals.
ˌanitary regulations for the home trade in ani-

Revision of local taxation.
County financial boards.
The malt-tax.
The turnpike trust question.
Rural education, and the employment of women
ıildren in agriculture.

what, we may again ask, is there in any
›f these subjects that could not be dis-
d by Farmers' Clubs? And what, we
further ask, is there in one of them that
ıot been thoroughly ventilated by Far-
Clubs and their organs, the agricultural
?
ʼw, we may ask, on what subject have
ations, and other means of bringing
ıre on the Government, been undertaken
hambers of Agriculture that could not
been undertaken by Farmers' Clubs?
inly there is nothing in the seven points
of the Central that the most scrupulous "Club-man" could not join a deputation on.

But in one of the seven points of the Central there is a question suggested of still more importance. If Chambers were so necessary, and if their functions were so obviously portrayed, and these functions have been so well employed, how was it that, after the Central, and many of the sixty-five provincial Chambers and branches, had been in existence for a year-and-a-half, it was found necessary to form a *Home Cattle Defence Association*, that no more unnecessary delay might occur in bringing this most important subject of all before the Legislature? We are writing most heartily in the interests of agriculture, and in putting these very natural questions, we simply want to know what *has* been done, that we may see, or feel, or grope our way through the present fog or haze, with a view of learning what *is going to be* done.

With the mass of correspondence we are continually having on the great topics of the day, we have of course our own opinions, arguments, and conclusions on the questions which we have raised. We have, however, been somewhat sparing of the criticism which has hitherto frequently suggested itself; for our expectations have been raised and our hopes have been flattered with glowing records and fine promises. But are there any satisfactory replies to be made to the foregoing questions? From the last reports we have in an authoritative organ, we do not perceive that anything more than theoretical replies are likely to be forthcoming. Here is a specimen of current reports:—*Swindon Chamber of Agriculture.*—The subject of *Dairy Management as opposed to the Factory System*, was introduced by Mr Hewer as follows," &c.

The origin of Chambers of Agriculture, as already set forth, may be distinctly traced to the efforts made by farmers to get out of the desperate positions into which they had been driven, under the pressure of, and want of relief from, taxation. The main effect which produced this desperation was loss of capital or want of profit. Villages had been deserted, or they had not increased in due proportion to the population of the kingdom, because the wages of agricultural labour could not be found, except in the isolated cases where men had capital to fall back upon; and because rents and other fixed expenses had grown to be an inadequate proportion to annual money returns. This pressure culminated in a demonstration, which may be described, in military phraseology, as an offensive attitude, when additional and unheard of losses accrued under the cattle plague, and appeals for Imperial help were met with ridicule, superfine philosophic speeches on political economy, and such sage advice as "Providence helps those who help themselves."

In this, the world's history is merely repeating itself. All great movements, whether for good or evil, have originated in great afflictions and material troubles. Smooth-sailing times, and that excess of comforts and luxuries which begets love of ease and pleasures, tend to the degeneracy of mankind, both mentally and physically, the end being, the generation directly concerned is insensibly transformed from vigour of mind and body to an effeminate condition of both. Here, therefore—that is, so far as the *origin* of Chambers of Agriculture goes—we may again say, history is only repeating itself.

But how much further are these Chambers likely to go in making history? Considering the eventful days through which they have lived, can they be compared for a moment with the rise and progress of other institutions which have been established in modern times? Have these Chambers already begun to halt between two opinions? Have certain professed leaders possessed and exercised a design to bring to pass this hitherto common eventuality among farmers, when they have attempted to associate? Was their origin, then, we may now ask, real or imaginary that is, was it really based on the material losses which British agriculturists had sustained and were suffering from? Or were their demonstrations a mere ebullition of temper, or a sort of human weakness in a fit, which merged into the form of wild party-spirit or vulgar-class revenge? In asking these strong questions, we are assured we shall not be misunderstood by the time we have fully ventilated this subject. What else can we think and ask? In other words—"Where are we now?"

Party designs have been disavowed from the beginning. In market-places, on platforms, and at the cross-tables of inauguration dinners, it has been proclaimed over and over again that no party feelings or expression would be countenanced for a moment by any of the leaders of Chambers of Agriculture; but that it was the intention of these institutions to carry out a pure and single-minded purpose—viz., to endeavour to enlist the interest and sympathy of, and to secure pecuniary assistance and "moral" and personal support from, every class in the community. In return for this courtesy and material beneficence, the classes not agricultural were to be taught lessons in agricultural economy, and the importance it was to them, as consumers, and to the nation, as a rival of other nations, that the agriculture of the kingdom should be untrammelled, or unclogged—in other words, that it should be untaxed. This was the basis on which "farmers' friends" were banding themselves together for the purpose of coming, in public meetings assembled, before the nation. It was on this ground that these associations were going to present their case to the nation. It was roundly asserted that persons and classes who could not be as well informed of the condition of agriculture as farmers themselves were, should receive adequate instruction; that they should be clearly and fully shewn how it was the farmers' business losses, and want of business profits, had left them in such a position, that their means of reproduction were not adequate to the growing wants of the nation. But has anything approaching to this programme been done? Indeed, has it been attempted? Nay, has it been shewn that the real question or situation has been fairly realized or comprehended by any of the men who have set themselves up as farmers' leaders, and professed to be imparting instruction from a common centre? On the contrary, has not the effect lt of these movements, so far, been emonstrations of party feeling acting undercurrent, than of any atempt at ion in politico-agricultural economy? e not all other classes outside of agri- in as great a state of ignorance in re- the real condition of the British farmer were before a single Chamber was ? And, further, notwithstanding that ntral has secured for itself a little faint from extreme "Liberals," and the ad- n of a few excitable village politicians, public men less sympathetic in regard cultural grievances, and the general more impatient under politico-agri- l sentimentalism, than they were before e Chamber was instituted, or the cur- tions of the Central were invented?

for a brief relation of facts and data. he parent Chamber was instituted in rgh, November 15, 1864, several con- le praiseworthy efforts were made in ounties. During this time the grand a Central Chamber was conceived, tenant farmers met with success in stances during the general election of he first flush of "victory" had its in- g influence, and a Chamber was subse- instituted in London, with a chairman ice-chairman complete. During the art of this year much animation as re- peechifying was displayed, and some expressions were made use of the Government then in office. not to be expected, however, that eadway would be made, and after g with their subjects during the Christ- ttle shows, the captain dismissed his to recruit their strength for any and ssault that it might be thought desirable e in the following year.

main incidents that have occurred the time which has intervened to the day may be given in a few words. tenant farmer M.P.," who was the representative of the Central, could h consistency assent to being its t, as he was new to the House of ns, and had many other engagements. herefore handed over to an aspirant for that honour, and a "tenant-farmers' M.P."—mark the distinction—was at hand to accept the vice-presidency. Here, then, we have a "tenant-farmer M.P." as the leader, although not the president, of the Central, and a "tenant-farmers' M.P." the vice-president. But when the former was announced as the seconder of Colonel Bartellott's motion for a "Commission of Inquiry into the working of the Malt-tax," &c., he was opposed by the latter (the vice-president of the Central), who gave notice that he should move for its immediate repeal or reduction. This notice was given!

Thus, the Central Chamber presented itself before public men and the country as not being agreed on the most vital agricultural question of that period. To recal this and other past incidents is our manifest duty at this time, however disagreeable the task may be; for the well-known saying, "A house divided against itself cannot stand," is more applicable to public associations of men, and particularly of farmers, than to any other bodies. The force of these remarks being made in this place will shortly be made clear. Where, it will be thought, were the organizers and controllers, or authorities, of the Central Chamber at this time? This is the point to which we are coming.

Towards the end of the year 1867, after representing his constituents two years, the "tenant-farmers' M.P." took the opportunity, at an annual meeting of a county Chamber, to lament that his county had lost two members by the Reform Bill of 1867. Yet during all the time that bill was in progress, not one single effort was made by the Central Chamber to save or increase the county members, who were considerably below, in regard to population and capital, the number of members representing cities and boroughs. In the same speech, this "tenant-farmers' M.P." and vice-president of the Central, took the opportunity of apologizing for and explaining away an impression that had got abroad, which was to the effect that he (the tenant-farmers' M.P.") was about to "organize a raid against the game-laws."

But we must again bring our review

abruptly to a close. If matters go on as they have done during the last few months, and particularly if they go on as the Central has begun to set the example in the present year, how many chapters of lamentations will there be "made into history" at the next annual meetings? And how many apologies and explanations will also be forced upon, or dragged perforce out of, the present authorities of the Central Chamber?

One of the points by which we justify these most dispiriting and discouraging views, consists in the portion we are about to extract from the authoritative public notice of the business to be done at the first meeting of the Central Chamber for 1869. Here it is:—

> *To consider the proposal for a national poor rate.*
>
> Mr H. Genge Andrews will move—
>
> 1. "That the income-tax assessment affords an economical means of assessment of all income to a national poor-rate, which may be placed to a separate account in the national exchequer, to the credit of the Poor Law Commissioners, by whom the half-yearly orders of boards of guardians and highway boards would be honoured."
>
> 2. "That the assessment to the poor-rate of all income arising from personal as well as real property would enlist the interest of all in its economical expenditure; and owners of property would have a more immediate and more direct interest than at present in preventing additions to, and undue increase of, the rate, and also in avoiding extravagant outlay in county matters, now exclusively under their control."
>
> The following *amendment will be proposed*—
>
> "The Central Council of the Chambers of Agriculture confirms the subjoined resolutions, passed on May 5, 1868, but considers it premature to advocate any particular remedy for the unequal incidence of the poor-rate before the whole subject has been submitted to a Parliamentary inquiry. (*Resolutions passed by the Council on May* 5, 1868.—1. That the taxation now levied under the name of poor-rate, to the extent of £10,000,000 annually, bears unjustly upon income arising from real property. 2. That the exemption from the rate of income arising from personal property is unjust, and therefore requires the early and serious consideration of Parliament.)"

The subject itself is an extraordinary one, looking at it from an agricultural point of view, but this we cannot discuss on this occasion. Nor can we enter into the merits of the amendment. But this we must ask. Has such a public notice as this ever occurred before in the history of the whole civilised world—excepting, of course, the history of the Central Chamber of Agriculture, and some other bodies under its foster-parentage? Here is an institution which professes to have been formed for the purpose of influencing the public and the Legislature on questions of national importance. Yet, time after time, not only are resolutions agreed to and announced, but amendments are acknowledged, and both are advertised in the public prints; and, at the same time, members of Parliament, and the outside public, are invited to come and hear the contemplated preliminary twaddling and squabbling — above which display the Central Chamber of Agriculture has not as yet ascended! Shade of Richard Cobden! let us invoke thy constructive power and persuasive aid.

Since the foregoing was in type, a *second* amendment has been advertised to come off on February 22d before the meeting of the Central. This apparently emanated from the Council itself. It is in the following terms:—

> "The Central Council resolves to press upon the Legislature the necessity of a full and impartial inquiry into the unjust incidence of local taxation; but, while recording its opinion that either by means of assessing the entire national income or otherwise, personal property ought to bear its fair share of that national obligation—the relief of the poor—the Council considers it premature to decide on the details of any particular remedy until the whole subject has been submitted to Parliamentary inquiry."

The Country House.

NOTES ON COTTAGES WITH COTTAGE PLANS.

CHAPTER THE THIRD.

WE now come to consider the principles affecting the *arrangement of* *rooms of the cottage.* Mr Isaac of Bath, his prize essay on "The Construction of ttages" (in the *Journal* of the Royal Agri- ltural Society, vol. xvii., part ii., p. 496), s the following:—"In the arrangements the rooms, we will commence with the amber floor, and here we would suggest at it should be essential to provide every ttage with three bedrooms, such an rangement being absolutely necessary to eserve decency and morality." It has en well observed by a recent writer— One crying evil prevails, want of proper eeping accommodation for a family. Many ttages have one, few more than two, sleep- g rooms, often to accommodate a man and his wife, and growing up sons and daughters. How, under such circumstances, can the rural population be expected to grow up in the habits of decency, morality, and virtue? And how can we wonder at the amount of vice and immorality which unfortunately prevails?" The size of these rooms forms the next consideration. No bedroom should be formed wholly or partially in the roof, or have a less cubical content than 500 feet. The allowance in hospitals is 1000 cubic feet for each occupant; in prisons and unions, 500. The contents of some of the bedrooms of the accompanying plans are 8 + 9 + 8 = 576 feet for the smaller ones, and 12 + 12 + 8 = 1152 feet for the larger ones. In the arrangement of the ground floor, the door of the living-room should open at once on the outer one,

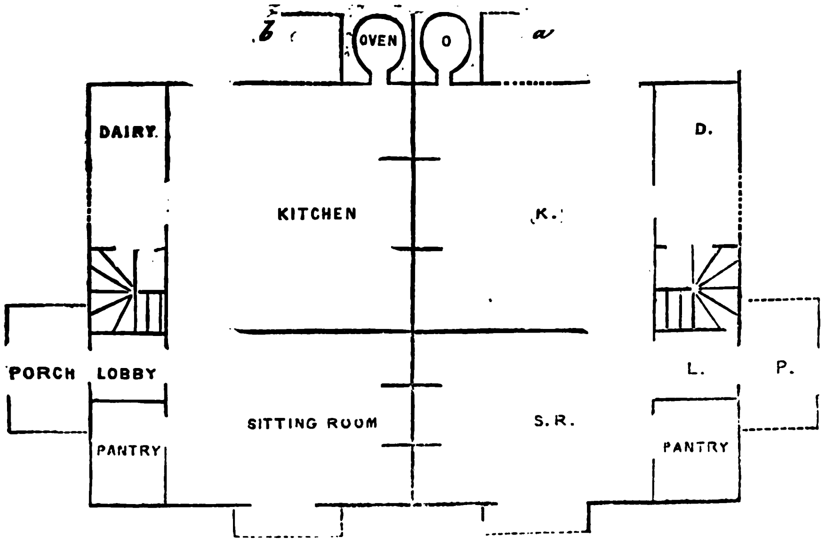
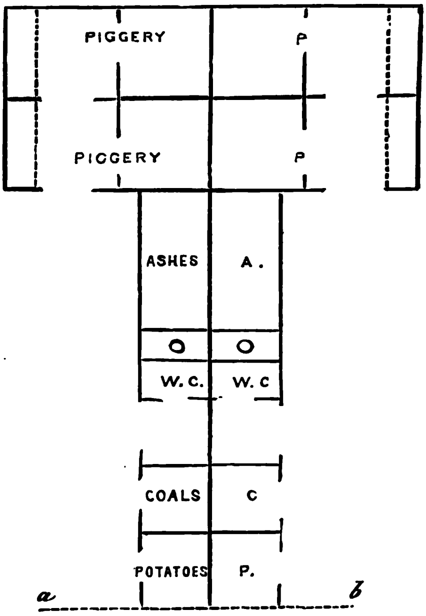


Fig 1.

but should, if possible, lead into a kind of entrance-passage or porch. No dwelling can be warm where this, or a similar arrangement, does not exist. The pantry should not communicate directly with the wash-house or scullery, since the food contained in the former would be rendered unwholesome by the operations carried on in the latter. A receptacle for coal should be constructed under the stairs, within easy access from the living-room.



Fi.g 2.

Relative to the arrangement of rooms, &c., n labourers cottages, Mr Loudon says:—

The door to the front kitchen, or best room, ould open from the porch, and not from : back kitchen, which, as it contains the king utensils and washing apparatus, can er be fit for being passed through by a ranger, or even the master of the family, here proper regard is made by the mistress leanliness or delicacy. When there is not pply of clean water from a spring adjoing the cottage, or from some other efficient urce, then there ought to be a well or tank, artly under the floor of the back kitchen, pplied from the roof, with a pump in the back kitchen for drawing it up for use. By placing the tank or well under the back kitchen, we both preserve the water from frost, and save the trouble of carrying it. The stairs should rise from the entrance-porch or lobby, so that the bedrooms may be approached without passing through the living-rooms; the convenience of such arrangement in case of sickness or death must be apparent."

The following, also from Mr Scott Burn's work on Cottages (Blackwood & Sons), dwells upon a point of great importance in the arrangement of rooms:—"There is one point in the arrangement of cottages for the working-classes, which ought to be specially attended to—that is, having as many separate bedrooms as possible in proportion to the intended or expected inhabitants. There is something especially revolting to a well-constituted mind in the very idea of a promiscuous sleeping apartment, and yet how often is such an arrangement carried out. It is quite unnecessary for us here to cite evidence in proof of this; we could easily shew how disgracefully prevalent the system is, and of how much and fearful an amount of depravity it is inducive." We shall merely note that one eminent authority states that parties who are subject to all its inconveniences and temptations, again and again

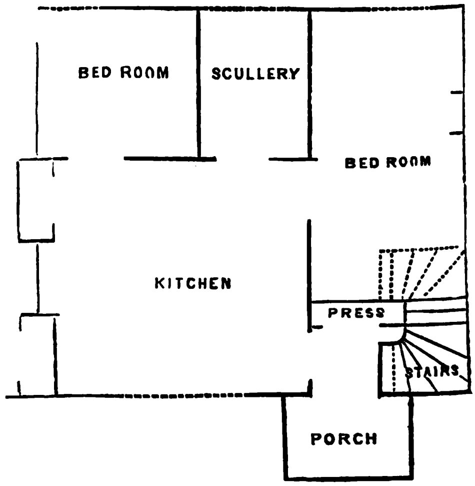


Fig. 3.

epresented to him that all sense of decency ad to be overcome, more especially in cases f disease, or else they had to submit to reat privation, suffering, and increased sickess. Those who know human nature at all now well which alternative would be adopted. he system of over-crowding in one apartnent is also inducive, as may be expected, of nuch immorality. The sequence of results as thus been well stated. "Over-crowding s a cause of extreme demoralization and ecklessness, and recklessness again, is a ause of disease." Not only, however, should he bedrooms be separate, so as to insure to each class of the family a distinct apartment, but it is also necessary that each should be completely isolated from its neighbour—that is, that one bedroom should not be entered through another. This may be considered unnecessary, or difficult to be attained; doubtless many view it in this light, as even in some first-rate mansions it is not desiderated; nevertheless, it is what we consider necessary to be adopted in a well-arranged dwelling. Where cottages are erected in rows it is necessary that each house should be quite distinct from its neighbour, such as having distinct back-yards, &c. We are no

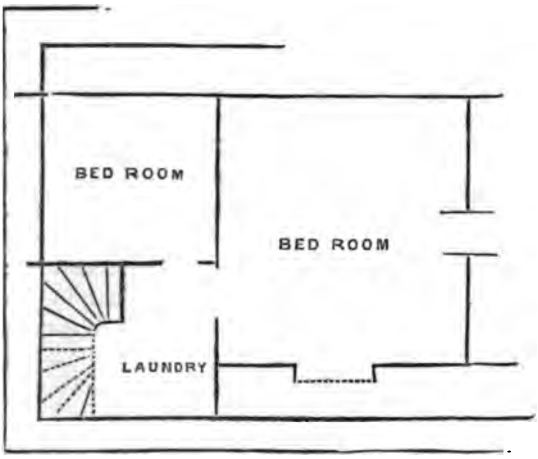


Fig. 4.

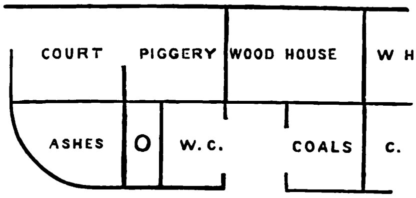


Fig. 6.

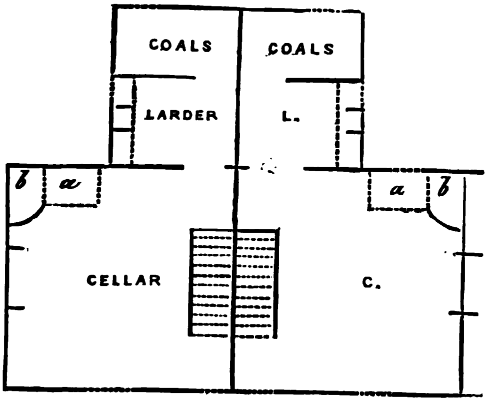


Fig. 5.

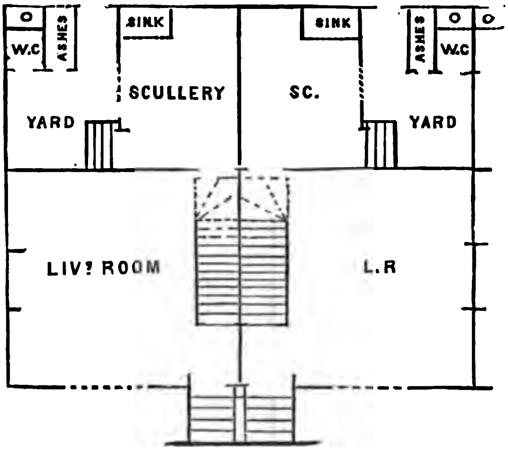


Fig. 7.

advocates of any place attached to a set of houses being common to all, unless under proper and well-regulated authority. Those at all acquainted with the subject are aware that it is frequently a cause of much contention, with consequent bad moral effect. A certain degree of exclusiveness in domestic life seems necessary, and it should be met by proper arrangements."

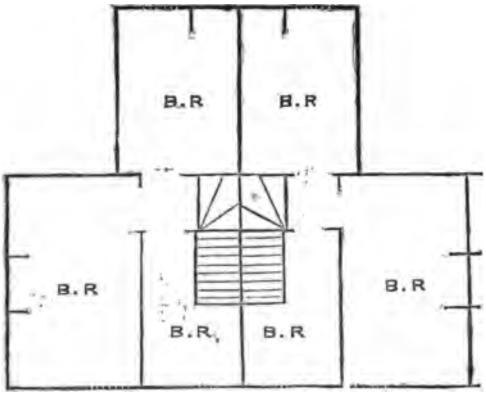


Fig. 8.

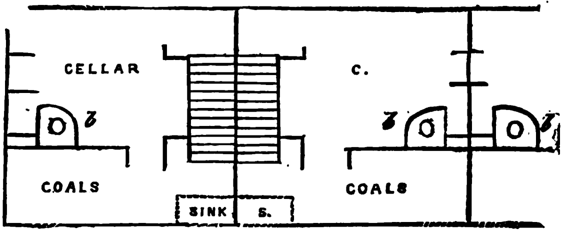


Fig. 9.

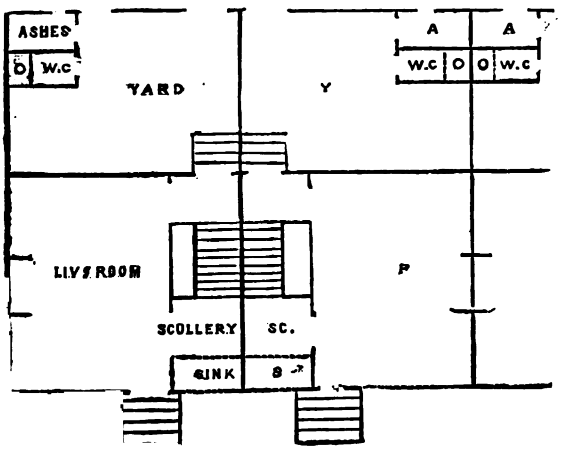


Fig. 10.

On the subject of arrangement, &c., of the dwellings for the working classes, a writer in the *Dublin University Magazine* for May 1860 has the following:—"That cottages in agricultural districts be erected in blocks semi-detached, with a quarter of an acre between the two houses. That, with rare exceptions, for aged and single couples, each cottage contains a living-room, say 12 feet by 12 feet, scullery 8 feet by 12 feet, pantry, and three bedrooms. The last provision is essential for the due separation of the sexes. Where cheapnes is a great consideration, a meat-safe might be formed in one corner of the scullery, the same having perforated zinc in the wall, opening to the air. That, to promote comfort, the cottages be floored instead of paved, and that a convenient kitchen range be fitted in the living-room. To promote ventilation, it would be well to provide that one casement in each room should be made to open, and that Dr Arnott's ventilator be fitted in each room in connexion with the chimney. It would always be well to choose an aspect as would add to the cheerful- ıf the cottage; this is, however, a point would occur to all. The roof should a simple description, so as to dispense valleys. It would be well to arrange the stairs should open into the lobby r than into the living-room. A porch bby should always be provided, so as event the rush of cold air into the -room."

ı figs. 1 to 5 we give outline sketch- shewing various arrangements of cot-

In fig. 1, we give ground-plan of a of cottages, erected on the estate of T. way, Esq., of Gunby Park, Lincolnshire; n fig. 2, the plan of out-buildings, these ıg up to the main block at the line *a b*. of the main features in this design is the ion of a porch to the inside lobby. This by some, be thought a superfluity; but can be no doubt of the many advantages ıg from the arrangement, so far as the ort of the inhabitants is concerned. The ion will represent a good amount of coals saved in the year, or additional warmth obtained, as compared with a cottage where there is no interior lobby, and, what is worse, no porch. In fig. 3, we give ground-plan of a pair of cottages erected in the south of England, fig. 4 being the chamber plan, and fig. 5 the plan of out-buildings. In these only one-half of the plans are given, the others being but repetitions. In this example, as in the last, a porch or entrance-lobby is given. There is also an addition of a scullery, and two bedrooms are on the ground floor. In figs. 6 to 11 we give sketch plans of various cottages erected at Ackroyden, in Yorkshire, all of which are designed to be erected in rows, but can be in pairs or even in single arrangement. In all of them, as will be observed, there are cellars given. We have so frequently, in the course of articles on the cottage question, gone into the advantages of this form of accommodation, that it will not here be necessary further to dilate upon the point.

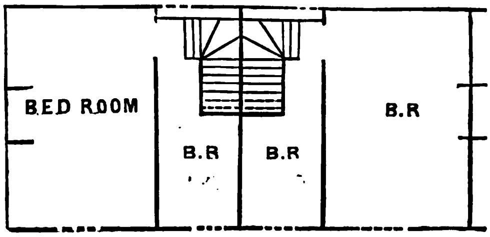


Fig. 11.

The Farm.

SUPPLEMENTARY FEEDING CROPS.

It is very generally admitted that both swedish and common, or rough-leaved, turnips are becoming more delicate and precarious crops, or at least that they are now less easily produced than they once were, in lands where they have been long cultivated. The usual reason assigned for this deterioration is that the soil is becoming turnip-tired, and consequently that much heavier applications of stimulating manures are now required than were once necessary to produce even ordinary crops. Further, a strong impression exists in the minds of many growers that this excessive manuring has rendered turnips more liable to disease, and also less capable than they formerly were of withstanding severe frosts. It is not our present purpose to enter into any discussion regarding these anomalies in turnip cultivation, but we may remark *en passant* that one great cause of declension in the hardieness or frost-resisting properties of turnips, is what may be termed too high breeding. The aim of all "improvers" being to secure size of bulb, combined with symmetry of form in both root and top, irrespective of any consideration as to whether or not the hardihood of the so improved varieties or "stocks" might be diminished [illegible] diminished [illegible]. Take, for instance, the [illegible] even the [illegible] green-topped [illegible] selection; as the [illegible] questionably [illegible] [illegible] and [illegible] attention almost exclusively, to the acquirement of enlarged and handsomely varieties having purple-coloured tops, in which they have, no doubt, admirably succeeded. The difference, however, in the hardiness of the sub-varieties thus acquired is so remarkable that few may be inclined to credit it who may not have verified the fact by actual experiment. This we did for a series of years, by growing the most of the sorts named in the seed catalogues; during which the relative hardiness of the different kinds or "seed stocks" remained very much the same. And, for the satisfaction of large bulb admirers, we may add, that increase of bulk, combined with good symmetry, was not necessarily accompanied with diminished hardiness; or, in other words, was not always incompatible with good constitution. A parallel case to the preceding came under our notice more recently, where an eminent agriculturist and very extensive grower, on making trial of a number of the most highly commended kinds, found some, which in their early stages he looked upon with favour, became almost entirely rotten and useless before the end of February; while others, which were fully equal to them in appearance, remained sound and good.

The turnip crop is unquestionably that to which farmers attach the greatest pecuniary importance, and throwing all question as to its degeneracy aside for the present, the fact stands prominently forward, that of late years, and more especially in the past growing season, ruinous failures of it have taken place over large districts of the country, in consequence of which the demand for extraneous feeding-stuffs has already become more than tripled, and even, notwithstanding their substantial but costly supplementary aid, much anxiety exists as to how the period between this and the next grazing season is to be got through.

adverse seasons invariably call forth
s that the success of so important a crop
l depend entirely upon contingencies of
eather at the time of brairding, as well
oughout the growing season; and re-
ons are frequently made to try, in future,
adjunct feeding crops, especially
as may be sown before the winter sap
ft the soil, and would succeed in seasons
are adverse to turnip growth. These
iendable resolutions are, however, too
ally abandoned on the recurrence of a
turnip season. And so exclusive turnip-
ng goes on, accompanied as before with oc-
nal failures and losses, which, to a con-
ible extent, might and should have been
fied, or provided against.

supplementary feeding crops, for partly
g the place of turnips, mangold wurtzel,
iitherto met with most general favour,
hat, it may be admitted, not undeservedly.
cabbage family have also had their ad-
es, and it is to two sections of this im-
nt tribe that we here direct farther atten-
–namely, the close-headed or true cab-
s, and the open-leafing or true kails.

the true cabbages, or "bow kail," pre-
ce is usually given to the large Drum-
cabbage, than which it may be con-
l that none are capable of yielding a
bulky or weighty crop; and for using
sively in the autumn months none are
ips preferable; but then it is incapable
thstanding very hard frosts, and conse-
tly not to be depended upon later than
mber. The Scotch Grey cabbage, once
generally grown in Aberdeenshire and
other parts of Scotland, was nearly
l in size to the last; among which not
representatives of it occasionally appears
hardy, coarsish, red-veined leaves; but
questionable whether it now anywhere
s in a pure or uncrossed state. It was
iently hardy to withstand most Scotch
ers, and its resuscitation is therefore highly
able. Then, there are the garden cab-
s, the larger varieties of which—such as
arge York—all yielding heavy crops, and
especially useful for cutting in summer
i other green food is sometimes scarce; and the same plants will again yield a good second cutting in autumn; while several of what may be termed the equally large-growing sub-perennial varieties, such as the M'Ewans and Chappels, may either be treated like the last for cutting in summer as well as in autumn, and again in spring; or they may be planted after the removal of early potatoes, and allowed to stand till needed in spring; after which they can again be cut two or three times throughout the summer and autumn.

Belonging to the open-leafing section or true kails, is the famous Jersey cow-cabbage, or Cæsarean kail, which was noticed in such a highly laudatory manner in *Loudon's Gardener's Magazine* for 1829, that many were induced to make trials of it in their fields; horticultural societies offered prizes for the best home-grown specimens, and caricaturists found in it a good subject for their satirical art. The properties ascribed to it being, among others, these of yielding continuous strippings of leaves, from the 1st of April throughout the summer and autumn, growing to a height of from 10 to 12 feet, and the stalks being useful for staking runner kidney-beans, as well as for forming cross rafters for thatch-roofed farm buildings, where, when kept dry, they have been known to last over half a century. That the height thus ascribed to it was no exaggeration became shortly afterwards proved as far north as the Carse of Gowrie, by Mr William Moyes, then gardener at Seggieden, obtaining the Perthshire Royal Horticultural Society's first prize, with branching plants fully more than 10 feet in height; but the total weight of leaves yielded throughout the season, even from such a monster plant, was deemed to be not more than would have been produced by one of drumhead cabbage, reared under like circumstances; while the strong woody stems of the former were rightly deemed to be highly soil-exhausting, and its cultivation in Britain was, therefore, soon abandoned. It is, however, still continued in Jersey; and visitors to that salubrious island generally bring away with them large walking-sticks or other stem relics, in proof of the tales which they may relate regarding the wonderful kail which they saw there when taking their country rides or drives. As a counterpart to the Jersey cow-cabbage, the thousand-headed cabbage, is largely grown in some central districts of England; and at Tansley Moor and other high districts, surrounding the Peak of Derby, we have seen the farmers planting this variety after the removal of early potatoes, as late as the first week of August; but it must be admitted that the earlier and principal crops were then 2 to 3 feet high, and nearly meeting in the drills. This last variety very much resembles the first in its general habit and appearance, only it is somewhat more branchy, as well as of dwarfed growth; and it is ostensibly grown for the feeding of breeding ewes in spring, but the leaves are also given to other descriptions of stock, from the finishing of the old grass to the commencing with the new. It is likewise very woody-stemed, and consequently soil-exhausting. Hence, although frequently recommended and experimentally cultivated in other districts, its introduction has rarely been much extended. In the Scotch kail, we have another open leafy variety, selected plants of which are about equal in bulk of produce to either of the two last, while its different sub-varieties are unquestionably hardier, and less soil-exhausting than either of them. These were pretty fully described in *The Farmer* of 29th January last. And in that for October 24, 1866, was a description of the Kilmaurs kail, then supposed to be nearly extinct, which we accompanied with an invitation, that any of our readers falling in with it, would favour us by sending plants and seeds. This invitation has, we are happy to acknowledge, been responded to by Mr Robert Moyes of Kilmarnock, who twice favoured us with plants, and once with seeds. One of these supplies of plants were of the true plane-leaved "lang kail," and the other, as well as most of the seeds, turns out to be slightly curled, but scarcely less bulky crosses, between it and the "dwarf green," as well as "red curlies." In our article of the 29th January last, we alluded to the Scotch kail as being still grown in a similarly crossed or mixed state, in some parts of Perthshire, where they are known as the Tullybeagles kail, and we have since learned that a like impure stock of them is well known in some of the most northern districts of Scotland. But as in Ayrshire, where they are chiefly perpetuated by the shepherds and other scattered population in the highest inhabited parts of the country, so in those other districts the selection of seed-producing plants is entirely left to the taste or caprice of the local plant-rearers, who thus grow their own seed supplies, and the seed dealers, from having little or no demand, take no pains in selecting or growing it. But were some of the most enterprising among them to take a lead in improving the Scotch kail by careful selection—taking the plain leaved "long kail" to start with—very superior sub-varieties would soon be obtained, highly suitable for field cultivation, as supplementary feeding crops, and well fitted for being partly substituted for the swedish and common turnips.

Many a stock farmer, whose winter and spring prospects are now sadly marred by the failure of his turnip crop, would give much for a field of hardy winter-resisting cabbage or kail—a boon which, with a little foresight, may be had in any season and at little cost, even when, as in the past, turnips first failed in brairding, or any that came up either entirely perished, or suffered irrecoverably from the drought, and that without in any way lessening the breadth or interfering with his turnips in favourable seasons. Even in the most favourable turnip years, however, a kail break would be of the highest advantage for the spring feeding of ewes and lambs.

For spring or early summer planting, cabbage and kail, more especially drumhead cabbage, are better to be sown towards the end of August; but in the absence of autumn-sown supplies of plants, they may be sown during the first favourable weather in March, choosing for this purpose warm, dry, sheltered situations, and protecting them when brairding from birds; then planting them out when sufficiently grown, either by themselves, in blanks where turnips have failed, or in ground cleared by the removal of early potatoes or other first crops. In the latter case, and whenever the planting must be deferred till July, it is better that the young plants be bedded out early in May, at 4 to 6 inches apart, so as to allow of their attaining to a good large size, and becoming well rooted by the time they are wanted. It is highly desirable that enterprising cultivators should try their hand at improving the varieties and sub-varieties of cabbage and kail, as well as the growing of their seeds. But whether home-grown or purchased, the cost of the requisite seed for sowing will be a mere trifle; and even should the plants not be all wanted in the event of a very successful turnip-brairding season, little or no loss will be sustained, whether the young plants be ploughed down as green manure, eaten by stock on the farm, or cut and carried off for feeding farm-yard pigs.

Strong objections are frequently urged against the field cultivation of cabbage and kail, on the score that they are very liable to be devoured by hares, rabbits, and wood pigeons, both at and shortly after planting, as well as in the winter months. Such objections are, however, not arguments against the propriety of cultivating these crops, but should rather be considered as strong reasons for keeping their destroyers within properly restricted limits. And unless in very exceptional cases, their devouring powers are by no means so very apparent when spread over large field surfaces, as when restricted to only small garden or paddock extents. Hares and rabbits are animals of rather "refined tastes," and will not tolerate any offensive applications on their food. Nor are wood-pigeons much less fastidious: hence the plants might be subjected to harmless steeps or other appliances before planting them, which would keep off these enemies till sufficiently grown to withstand their attacks. Fields within shot range might be chosen for growing them upon, to insure their greater winter safety; and even if necessarily grown in more out-of-the-way places, they might be advantageously lifted in November, and replanted in more preserved and safe places, with the aid of the ordinary plough for covering in their roots.

At the Christmas fat stock shows held recently throughout the kingdom, large drumhead cabbages were frequently exhibited along with turnips and other field roots; but they only proved, by their blanched or wasted appearance, and want of green leaves, that, although admirably suited for autumn feeding, the period of their usefulness had passed. Heavy and bulky although most of these undoubtedly were, they might have been surpassed in weight by various kinds of the larger hardy winter brassica, had inducements only been offered to growers for bringng them forward. And were agricultural societies to offer premiums for the production of the largest and freshest plants of hardy greens at their winter and spring meetings, and especially with such competitions made open to cottagers, highly valuable supplementary feeding crops might be obtained from sources which have hitherto been almost overlooked.

ON SOME POINTS CONNECTED WITH THE SCIENCE OF CATTLE FEEDING.

BEFORE entering into a further consideration of the relative importance of the different classes of food constituents as life supporting, it will be well to present our readers with a *resume* of the analysis which have been made from time to time of the various sources of plant food; inasmuch as in connexion with them we may have so remarks to offer of a suggestive and practical character :—

TABLE No. I.

Constituents.	GRAIN OF THE CEREALS.						STRAW OF THE CEREALS.			
	Wheat.	Barley.	Oats.	Rye.	Maize or Indian Corn.	Buck-wheat.	Wheat.	Barley.	Oats.	Rye.
Water	12.26	14.95	13.09	13.00	14.96	14.2	14.23	14.30	12.06	14.30
Flesh-formers	11.64	10.84	11.85	13.83	11.27	8.6	1.79	1.68	1.63	2.29
Heat and fat producers	68.74	68.31	63.34	71.50	67.48	75.4	31.06	39.98	39.98	37.15
Woody fibre	2.61	3.45	9.00	10.29	5.02	20.6	45.45	39.90	39.80	43.18
Ash	1.75	2.75	2.72	1.7	1.27	1.8	7.47	4.24	4.24	3.08

TABLE No. II.

Constituents.	Leguminous Seeds.		Leguminous Straws	
	Beans.	Peas.	Beans.	Peas.
Water	14.8	14.1	2.90	12.00
Flesh-former	23.3	23.4	6.79	12.55
Fatty matter	48.5	50.0	63.96	21.93
Woody fibre	10.0	10.0	—	47.52
Ash	3.4	3.4	6.35	6.00

TABLE No. III.

BRAN, MALT-DUST, BARLEY-DUST, OAT-DUST.

Constituents.	Bran.	Malt-dust.	Barley-dust.	Oat-dust.
Water	12.86	6.24	11.03	9.31
Flesh-formers	13.80	25.62	8.46	6.92
Oil	5.56	59.44	3.47	3.21
Woody fibre	11.50		69.73	
Starch, Gum	50.17			72.86
Ash	6.11	8.70	7.31	7.70

TABLE No. IV.

Constituents.	Swede.	Mangold.	White Globe.	Potatoes.	Carrots.	Parsnips.
Water	89.40	87.78	90.47	75.2	80.03	87.5
Flesh-formers	1.44	1.56	1.14	1.4	1.21	0.6
Fatty matters	not determined	,,	not determined	22.5		
Sugar, Pectin, Gum	5.93	8.60	2.96		7.0	6.6
Woody fibre	2.54	1.12	2.000		8.02	3.3
Ash	.62	.96	1.021	0.9	1.04	1.0

TABLE No. V.

LEAVES OF PLANTS.

Constituents.	Cab-bage.	Rape.	Leaves of Man-golds.	Leaves of Swedes.
Water	86.28	87.05	91.96	88.36
Flesh-formers	4.75	3.13	1.76	2.08
Fat and heat producers	7.10	4.64	4.98	7.25
Ash	1.87	1.06	1.29	2.29
Woody fibre	,,	3.56	,,	,,

ce our series of analytical statements e enough for our purposes by giving stituents of hay:—Water, 14·61; mers, 8·44; fat and heat producers, ash, 6·16; woody fibre, 27·16.

may be taken as the results of labo- hemical research, and which offer to us ons of what is the feeding value of the crops of the farm which are used as feed- stances. But that this indication is not accurate, or rather that it does not o all specimens of the same produce, obvious enough when we take into ration the fact that there is a remark- versity in the character and quality luce grown in different localities, and tween the produce grown in the same , and under apparently the same cir- nces. Now, it appears to us, that this y in the character of the produce aterially modify the results of chemical s—so modify them that the analysis root, for example, will not be the ana- another root of the same kind. We know accurately, but we can make a fair conjecture of what must be the es of different modes of cultivation, of t manures, different soils, and all the rities of locality, climate, weather, upon duce grown. It therefore cannot be place full reliance upon analysis, as ed, as yielding accurate indications of ding value of any special variety of e, for experience tells us, without the analysis, in examining two or more s of the same root, that they vary—are vary in feeding value. One root, for e, may be sound, fleshy, and firm, may be the reverse of all this, or p largely of woody fibre. As a very ad- authority on agricultural chemistry admits, that chemists and others are ch in the habit of treating feeding sub- as if they were "simple chemical combi- ;" whereas, he says, the differences be- wo samples of the same substance are tly very great, and cites as an example, grown upon peaty land, and another upon good land, and also the differ- at exists between two kinds of hay, one good, the other unmistakably bad—that is, to outward examination. Now, analysis might shew that there was a difference in their feeding value, just as the examination made by a practised feeder would make him certain that there was; yet, nevertheless, analysis might *not* shew this difference. But this as it might be, it is quite obvious, that if the feeder was turning to a published analysis, such as we have given of any variety of produce, it would only give him the results of that *particular* analysis, and would afford no positive indication of what the value might be of his own produce.

But notwithstanding what we have here said as to the value, or as some would say, the "no-value" of analysis, in the direction we have been discussing, it would be altogether wrong to conclude that it has no value in another, and to a large extent, a useful direction—that is, in shewing the *relative* value of various kinds of produce, and how in what way one kind varies from another kind. Thus, analysis shews with precision the characteristics of the cereals as differing from the roots, and it therefore is valuable as shewing the destinctive feeding properties of various kinds of produce, and enabling us to see how far each is likely to aid the practical purposes of feeding. Thus we find, that although analysis of farm produce does not, as in the case of purely chemical combinations or bodies, give us results, which, once obtained, will *always* apply to the same produce, for this is forbidden by the peculiarities of outline, locality, &c., to which we have already alluded; still, it does afford us relative information as to their feeding characteristics and properties of considerable value in the practice of cattle feeding. No science ever gains by claiming too much for it, and it is doubtful, to say the least of it, whether that of agricultural chemistry has gained by the persistent claims which have been made for it, as likely to be an unfailing guide in some directions, which it is only right to say it is not calculated to be. It cannot by itself be this unfailing guide where certain circumstances, mainly physiological, come into play. What some of these are we have alluded to already; what others are we have still to place before our readers.

DEEP CULTURE IN RELATION TO THE RETENTION OF MOISTURE IN ARABLE LAND.

IN the paper in last week's *Farmer*, intitled "The Season and its Labours," special and pointed attention was drawn to the fact that a very great deal of land is not ploughed in the proper sense of the term—that is, it is merely turned over and nothing more; and allusion was made to the fact that this probably arose from so many being afraid to plough deep. We shall in a future article go more fully into a consideration of the advantages obtainable by carrying out deep land culture systematically; meanwhile we would here draw attention to one advantage which can be obtained, which is often overlooked, but which, nevertheless, is of the highest importance—namely, the "retention of moisture in arable land during drought." To this subject the experience of the last season gives marked prominence; and, although that is generally spoken of as "exceptional"—for aught we know—it may be repeated in the season which is next to come. But, be this as it may, the subject carries with it so many suggestive considerations that it is worth while to enter upon it as fully as the space at our disposal will permit.

No person who is in the least versed in agriculture can have failed to observe that the properties and produce of soils are very much regulated and determined by the quantity of moisture in them. All soils are capable of holding more or less water in their interstitial spaces, and by adhesion to their particles, their several capacities depending as much upon their mechanical texture, as upon the materials that enter into their composition. Clay soils in drought become hard, firm, and adhesive, lumping so much into clods that common implements cannot pulverize them; but when drenched with rain they become unctuous, mortarry, and tough, and to such a degree that tillage is impeded.

The atmosphere as well as the soil contains variable quantities of water, acco
to the varying conditions of the aerial o
It is ever imparting moisture to, or rece
moisture from the soil, either by the pr
of evaporation or precipitation in the
of dew or rain. The quantity of aq
vapour floating in our atmosphere, even
it cannot be pronounced humid, is al
incredible. In its normal condition it
been estimated to amount to a qu
of a million of gallons over each acre.
a column of mercury, 30 inches, it exe
pressure of forty-four decimal parts
inch, which quantity (assuming its sp
gravity to be identified with the atmosp
would, on condensation, cover the surfa
the earth to the depth of nearly 6 inches.
soils, say 1 foot deep, as distinguished
the subsoil, of a medium description,
taining 20 per cent. of water, the wat
separated and placed on an impervious
surface would cover it to the depth of 3 in
This may be about the medium amou
land after the March winds have drie
superabundant rains and snows of wi
but in the generality of soils it is not
palpable, does not shew itself, for t
much in excess of what would be believe
many.

Besides the important part that eva
tion plays in relation to the moisture i
soil, much water passes downwards by
tion through the soil. The quantities
leave the soil by each process respec
are very indeterminate, varying very
according to the season of the year, th
and subsoil, situation, and hygrometric
of the atmosphere. Evaporation during
June, July, and August exerts its maxi
influence when the rainfall is at a mini
During these months very little wate
scends into the subsoil, or passes awa
drainage, for the drains, as a rule, disc

r no water then. At all periods we
termine the rainfall, and also, approxi-
, the deposit of dew; but the amount
oration during any given period can-
resolved very determinately.

e, at the very outset, we meet a diffi-
in assigning names to the soils that
nder our proof-tests; for, indeed, most
attempts hitherto made, to give an in-
le classification, have proved unsatis-
, and the next thing to an entire
Perhaps the nice shades of differ-
the composition and texture of soils
render precision in this — the very
et of agriculture—unattainable. The
t a "clay soil" conveys as precise an
people in localities widely separated
name of any other particular kind or
f soil; yet if clay is mentioned before
ting of farmers drawn together from
nt counties—each would recall the
f the soils of the same denomination
has seen. One is familiar with clays
most barren kind, and another would
tand by the same phrase the most fer-
soils, while a third attaches to the term
e same idea that is conveyed by the
"earth" in some parts of the United
om. To classify soils according to the
derating ingredients in their composi-
s ascertained by chemical analysis,
t do, as any person will be convinced
xamine a series of soil analyses. It
ffice to state, on this point, that we
amed soils in the way that seems to
general acceptance, namely, accord-
what they appear to be.

experiments with soils in relation to
re were begun in 1855, and as an
tion we shall give the outlines of our
lure during the summer of that year.
g occupied a light thin soil on a
ly subsoil, that rested on the old
ndstone, with a small annual rain-
the locality, the means and methods
ted to retain moisture in the soil
themselves on our consideration.
ials, however, were not confined to the
avelly soils referred to, but embraced
l differing materially from the foregoing.
It is proper to state, also, that the methods we tried, to counteract the injurious effects of a dry climate and a period of drought, were not confined to those we shall hereafter enumerate; and they were undertaken to ascertain how much moisture was retained in the soil by the several methods pursued. We thus could judge of the effectiveness of our plans, not merely by the apparent improvement in the crops cultivated, but also by the increased amount of water retained in the soil. March closed that year without a permissible state of soil for spring sowing, fourteen days having been more or less wet, and the aggregate precipitation measured 3.3-10th inches in the rain-gauge. April was marked by only three partially wet days, and four-tenths of an inch of rain. At the beginning of May there was a mean of 14 per cent. of water in the soil. The parching arctic winds from the eastern points of the compass prevailed on 15 days of May, and neutralized the effect of the precipitation of the month, which amounted to 1½ inches. June also brought an inch and a half of rain, with a pretty high temperature. July was parching without rain till the 14th day, when the crops were languishing and earing in a stunted form. At this date the earth, from two fields of growing oats, only held 8½ per per cent. of water, and from a turnip field of a similar soil there was 11¾ per cent. Showers, measuring in the aggregate one inch and a quarter, fell on the 15th and four following days; three sunny days succeeded, when one of the oat fields that had been subsoiled and partially drained gave 11¼ per cent. moisture, and the other 10½, while the turnip field still retained the highest per cent., namely 12¾. In the concluding days of July, one inch and fifteen decimal parts of an inch fell. On the 2d day of August the several fields were again tested for moisture—the subsoiled one gave 11 per cent., the other oat field 10 per cent., and the turnip field 14⅓ per cent. Experiments in subsequent years brought out similar results.

The fields of the above experiments went by the name of "clay soils," with retentive subsoils. Till drained and subsoiled, or deep ploughed, they were esteemed poor and rather stiff, with a close subsoil and redundance of water. In these determinations the *modus operandi* was simple and easily manipulated. Estimating the soil at 8 inches deep, we took a portion of earth (holding what was a mean amount of water), 4 inches below the surface; it was then weighed, dried at 212° Fahrenheit, and again weighed, the loss giving the percentage of water. These quantities of water in the soil may be better understood, when it is explained that 40 per cent. saturated these soils, and 20 per cent. formed a tolerably dry seed-bed for grain, and a suitable tilth for harrowing in the seed.

We have referred to the foregoing matters because they have a direct bearing on the subject of this paper, and for the purpose of making some of the points involved more explicit. That a sufficiency of moisture for the requirements of the crop is a matter of first importance none will deny. In short, moisture in the soil constitutes the essence of the vegetative strength of the ground for the season, which, when once dissipated, is not often recovered during the period of the growth of cereals in weak soils and dry climates. The first rains, after a protracted heat and drought, seem rather to make things worse than better, for the most parched spots extend in area and the sickly plants on and around them languish and wither still more.

We had recourse to several methods for preserving the moisture in the soil, but it is to only two of those that we shall for the present draw attention, reserving the others to be given in a succeeding paper. The two we give now are, first, deep culture of the soil by deep digging, trenching, or subsoil ploughing and pulverising of the soil, these having been specially referred to in our opening remarks.

Deep digging, trenching, or subsoil ploughing are means for preserving the moisture in the soil during heat and drought. There are not wanting many evidences that the several acts of husbandry stated under this head are advantageous on every description of land, even the most water-logged fields. But drainage s a *sine quo non* in such fields, an operation that has been descriptively defined by Major M'Inroy as "under-ground irrigation." "I consider," says he, "the most perfect system to be that which allows air and water to pass freely through the soil with their dissolving and fertilizing properties." Previous to draining and deep-stirring chemical action is very much confined to one stratum of soil—namely, where the air is neither excluded nor free, and where it is neither dry nor wet (speaking in common-place words). Subsequently the laws of composition and decomposition have full play, and their effects are diffused throughout the whole mass of soil In an essay published several years since (for which the Marquis of Tweeddale offered a prize) it was said "that in every instance drainage gave a decided advantage in the increase of temperature, except only in summer, when a heavy fall of rain was found to lower the temperature of drained land more than undrained," which is evidently an advantage to a hot parched soil.

The writer subsoiled nearly 100 acres of a light, thin, incoherent soil, consisting of a small portion of black earth, with gravel and sand resting on a gravelly open subsoil. The subsoil plough, which was drawn by two horses in the track of the common plough, stirred the ground to the depth of 12 or 14 inches. The weak point of the land so treated was its dryness, for even moderate heat and drought scorched whatever crops were grown; but we found the process beneficial, the crops more abundant, and less liable to suffer from an arid atmosphere. The rain-water did not pass so rapidly away, and we ascribe this to the subsoil ploughing shutting up the grooves and channels through which the water had descended for untold ages.

For this explanation we have been several times taken to task by intelligent agriculturists, who affirmed that subsoiling opens pores and interstitial places for the more rapid descent of water. Such we believe is the result of the operation in retentive bottoms.

The pulverizing of the soil also contributes to the retention of moisture. We were in this point a follower of Jethro Tull, and it was the perusal of his writings that set us to

He pronounced the opinion that
zation was the one great idea of suc-
farming. When large cavities abound
l, plants suffer more in dry weather
land with minute pores. This pro-
n seems to be self-evident, but
often been disputed, as contraven-
w of capillary action, that the ascent
er is in the inverse proportion of the
er of the tube. Now, it cannot be
that a fine division of the soil is
us to small capillary tubes; but one
fairly overlooked in this reasoning—
that the fine small particles of soils
ted together excluded largely the air
and thus prevent the full evaporative
that would otherwise rule and operate.
d that, in digging a hole in the soil in
dry weather, pounding down the excavated earth, and afterwards retusning it to the hole, more moisture is absorbed and retained than in the surrounding ground. This process we have brought to the proof, and found its truth amply verified in soils holding something less than their normal quantity of water, but in cases where moisture was redundant it was otherwise.

In the prevailing plan of draining soft flats forty or fifty years ago, we have undoubted evidence of the powerful action of evaporation. The shallow stone drains of 18 inches proved an entire failure, so far as the removal of the surplus water was concerned. The great law of gravitation being counteracted by capillary, the soft flats remained nearly as moist as ever.

HE INFLUENCE OF RAILWAYS UPON AGRICULTURE.

BY MR J. K. FOWLER.

Author, in his introductory remarks said, that
hen he alluded to increase of rents and other
f a like nature, consequent on the introduc-
ines of railway, he should studiously avoid
he localities, as he well knew the sensitive-
is brother farmers on all such things."

TRAVELLING IN THE OLDEN TIME.

seventeenth century the inhabitants of London
r almost every practical purpose, "further
ding than they are now from Edinburgh, and
rom Edinburgh than they are now from
And in a very interesting book, written by
an I knew well, the late Sir Cusack Roney,
Rambles on Railways," he begins by saying,
2 the course of post between London and
h was two months; one month going with a
d one month coming back with the answer.
ears afterwards the one stage-coach between
and Edinburgh started once a month from
; but in nine-tenths of a century speed had
elerated. It only took a fortnight on the road
irection. Seventy-five years afterwards, that
7—the year before any portion of railway
the two capitals were opened for traffic—the
h completed its 400 miles in 42 hours, or one
urs. Now-a-days, our limited mail (one of
limited' associations of very modern date that
ome to grief) is only 10½ hours:" so that a
letter might be written and a reply obtained in less than a day and night.

COMMENCEMENT OF THE PRESENT CENTURY.

However, I shall not take you back to those times, but will begin by a few remarks upon the beginning of the present century. At that time the means of transit through the country were very meagre indeed. The main thoroughfares were in tolerable order, and as time wore on turnpike roads were formed, and the great lines of communication became noted throughout Europe. Many I now see around me can remember with pride the splendidly-appointed four-horse coaches, the slashing mails — the carriages of the nobility and gentry—the old yellow post-chaise, and the modest gig thronging the great lines of road, and rendering a journey from town to town cheerful and pleasing; but along with these were the eight-horse broad-wheeled waggons, heavily laden with manufactured goods and the lighter productions of the land, such as butter, cheese, and poultry; and the market waggon of the farmer, drawing his 10 quarters of corn, with four horses, 15 or 20 miles to the market town, or to the water-mill of the district. Only a few labourers would be seen trudging along; but the farmer himself, on his useful hackney, jogging along the road, and his custom of rather late hours at market, was a standing joke among his fellows. The country roads were in a deplorable state; in some districts the want of material rendered them almost impassable, and the difficulties of carriage for all sorts of agricultural produce rendered it troublesome and expensive to get to market; but for all these difficulties agriculture improved, and with improved system of cultivation came better roads, and greater facilities for disposal of produce.

AGRICULTURE 30 YEARS AGO.

In addition to the state of the roads I will briefly allude to the state of agriculture some thirty-five years ago, previous to the introduction of railways. Agriculture, as I have previously remarked, had been more than a century progressing rapidly in the kingdom, and the great revolutionary war in France tended to enhance the value of agricultural produce to a very great extent, and many thousands of acres were put under the plough, and I believe in many districts large fortunes were made: distressed times came, the war ceased, prices fell largely, pauperism increased fearfully, and the money panics of 1819 and 1825 brought ruin and dismay on many a happy and prosperous home. In the year 1830 greater distress prevailed, large numbers of the labouring population were out of work, incendiarism and the "Swing" riots spread over the land; the work-houses were filled to over-flowing, poor's-rates increased to an alarming extent; many thousands of acres which had been put under the plough were allowed to go out of cultivation, and "fell down," as it was called, into poor pasture, and the new Poor-law was the result of this combination of circumstances. I am not now going to discuss the political causes which led to this state of things, but I merely relate the facts which occurred. The state of the agricultural population at this time was at a very low ebb. I was then a school-boy, but I remember that in 1833, nearly every farm in the parish of Aylesbury was in the hands of the landlord, and many of the finest farms on the Duke of Bedford's Bedfordshire estates were out of occupation. Rents in our district were as low as 20s. to 27s. per acre, the wages of the labourer were 8s. to 9s. per week, and the poor's-rate 16s. in the £, with two labour-rates of 1s. 6d. each, making nearly 20s. in the £, and I regret to say this was no exceptional case.

INTRODUCTION OF RAILWAYS.

In the year 1833-4, the Grand Junction and the London and Birmingham Railways were commenced; many other lines followed; the superabundant agricultural labour was draughted off into these new channels, and the plethora of stalwart unemployed country labour found a vent, and the new Poor-law, the application of which at one time threatened to produce a revolution, began more quietly to be established. This may well be said was one of the "Influences of Railways upon Agriculture." It will simply be impossible for me, without tiring your patience, to go into all the various details of how railways have influenced and are influencing agriculture, and you must pardon me for refusing to go into heavy statistics—all these are to be found in various railway returns, from animals into every district of the kingdom, besides large numbers sent abroad for the improvement of foreign herds. Surely railways have done something here for the "Roast beef of Old England!" I find that Mr Strafford left Euston Square this last September on a Monday evening, went down to Killhow in Cumberland, held three large sales of shorthorns on three consecutive days, and was home again by the next Saturday morning. I don't know how much sleep he had, but he travelled over 700 miles. It is difficult to know how things were managed formerly; but I am informed on good authority that Lord Althorp, afterwards Earl Spencer, engaged his bed at Rushyford Hotel in January to attend the Chilton sale the following autumn; and when George III. hired the noted bull Windsor, of Mr R. Colling, he was nearly three weeks in getting him to Windsor; and the noted bull Duke of Northumberland and the Oxford cow and two calves, exhibited by the celebrated Tommy Bates, were sent by the Stockholm steamboat to London, then by canal-boat to Aylesbury, and thence by road to the first show of the Royal Agricultural Society of England at Oxford. It was a work of nearly three weeks to get them to and from the show, and the expenses were over £90, and the prizes won about £70; now they could be sent to the same place in twenty-four hours, and the cost there and back would be about £12. The statistics at the end will give you some idea of the numbers in consecutive years of stock exhibited, and of persons visiting the Royal Agricultural Society of England's meetings from their first show at Oxford in 1839. Most of the stock has been sent out and home chiefly by the railways; and hundreds of ardent lovers of shorthorns, Herefords, and Devons have been enabled to visit the most celebrated herds, and form the nucleus of fresh herds to give food for the people. One of my shorthorn purchases at the Didmarton sale last spring was sent from Chippenham station at 11 A.M., and arrived by a very roundabout way safely at my farm by 3.25 P.M. the same day, a distance of more than 100 miles. These facts shew how railways influence opportunities for the breeding of cattle.

DEAD MEAT, POULTRY, ETC.

Having stated thus much upon live stock, and shewn cursorily what railways have done for that portion of agriculture, I come to quite as important a function which they perform for carrying dead meat, poultry, and other food for the people. It is incalculable in how many ways the feeding of the people is influenced by railways. It is not the province of this paper to go into the question of the transit of fish; but, as it bears upon the food of the people, to a certain extent it indirectly acts upon agricultural products. I shall merely say that salmon is sent now from the Scottish and Irish rivers almost alive, packed in ice, into the metropolis in less than 24 hours, and gives a splendid n to our human feeding-stuffs to almost all of the people. In my own inland town of ury we receive a daily supply of excellent fish Great Grimsby. But if fish is important what must be the supply of dead meat? I y returns which I have before me that the n and North-Western Railway brought upwards 76 tons of dead meat into London alone during st eleven months of the year 1867; and when own that splendid meat can now be sent from een in thirty hours, and the mutton from Dart- nd pork from Devonshire in fourteen hours, you see again how railways influence agriculture. is another branch of food for the people in railways have played an active part—viz., y and eggs. The consumption of these s of food is so enormous as to exceed belief. idland Railway, in the year 1867, brought 141 f eggs, and the Great Eastern alone brought ns of poultry and game. But this is a mere e in the course of the year; and from my own it is no uncommon thing in the early spring s for the Aylesbury Railway to carry 2 or 3 tons of ducklings, butter, and eggs, up in one night ndon; and it is stated that nearly £20,000 per for ducks is returned into the neighbourhood ylesbury alone. There is another product land which has been made considerably available for manufacturing purposes by rail- -I mean wool. The establishment of wool fairs have been but of little use to the farmers if rail- ad not enabled buyers to attend them. Now at northern towns of Leeds, Dewsbury, Brad- leckheaton, and others, pour out their buyers e midland fairs, and create a healthy competi- this most valuable product with the buyers of est of England; and in many instances the wool t to the fairs one day was at the great centres nufacture the next. There is another great tural product which must not be passed over— vegetables for the early spring. From Corn- d the extreme south and west counties, cauli- , early peas, potatoes, fruit, and all sorts of produce, are now grown and sent easily to t in as fresh a state as the market gardens near ous railways, and in Board of Trade returns— ill touch on the most salient points.

TRANSIT OF PRODUCE.

t, then, as to transit of produce. Since the in- tion of railways into the hacknied motto of the aders has been fully verified, of "buy in the st and sell in the dearest market." In fact, the country has become one great market. As the rewers of Burton-on-Trent send their represen- to buy the choicest samples of barley through- land, and the energetic factors of the great n towns have their agents in many of the n counties to buy the choicest white wheats to ith the coarser red wheats of Yorkshire and Lincolnshire, whilst the oats of Scotland and Ireland are now transported cheaply and easily to feed the thousands of horses engaged in the great metropolis. I know much of this is brought by sea, but railways influence the cost of transit. The potatoes of the moory soils of the north are also brought to London, and also into the great centres of the manufacturing districts. Whilst the hops of the famed southern counties are rapidly sent to every part of the kingdom, and the glories of Weyhill fair, with its long line of farmers' waggons on the hills of Hampshire, will, certainly, in a very short time be no more, from the all-powerful influence of the iron road. I have thus rapidly glanced at the effects produced by railways on the arable districts of the kingdom, and if these effects have been great there, how much greater are they in the pastoral districts of the kingdom? In my own rich and fertile vale of Aylesbury, where the Hereford ox finds a genial home, and the North Devon revels in its rich green pastures, and the placid shorthorn yields up her milky riches, the grazier of the vale can go to the western fairs of Hereford, Leominster, or Kineton in half-a-day; buy his beasts, can see them put on the rail, and they are safely home the next morning; or he can meet them half-way at various markets or fairs, and bring them home the same night. The same may be said of the half-bred sheep from Lansdown, near Bath, the west-country Downs from Salisbury, the Shropshires from Shrewsbury, and even the prolific Norfolk ewes from Norwich Hill—all these are easily and readily transported from and into the various districts where they are required. In like manner the horse fairs of Horncastle, Lincoln, &c., and the Exmoor pony sales can now readily be reached by the railway. And here let me digress for a moment to show how all were deceived about the demand for horses. The breed of horses was considered to be at an end when railways were introduced; but there is a greater necessity for them than ever, although I regret to say the stamp of horse prevalent thirty years ago is nearly gone; I mean the rare old-fashioned wheel-horse for a coach, or, as he was called, "a riding-post chayer"—a horse on short flat legs, with good shoulders, famous loins, head well up, and shortened tail, bending his knees up to his chin, and trotting along from ten to twelve miles an hour. Here railways seriously "influenced agriculture" by driving the breeding of this useful animal into that wretched three-parts-bred weed which now is seen in traps of all descriptions at our railway stations. Carthorses are also increasing in demand, to carry the immense products of our manufacturing towns to the railway stations and seaports throughout the kingdom.

BREEDING OF CATTLE.

I now come to another most important manner in which railways have influenced agriculture—I mean the breeding of live stock, more especially shorthorns; and if I will dwell for a moment on this matter, I hope

I may be pardoned for so doing, as you all know my favourite hobby, and the same rules will apply to breeding all other stock. The first stimulus to breeding shorthorns was given by Mr John Day, travelling the country round with his celebrated "Durham ox," bred by Mr Charles Colling, by the celebrated bull "Favourite." This ox was taken to nearly all parts of England—from the banks of the Tees, where he was bred—and was exhibited for several years, when he was slaughtered, weighing the enormous weight of 300 stones of 8 lb. This gave a great desire to obtain this breed, and a great sale took place in 1810 of Mr Colling's stock. There was no other sale until 1818, by Mr Robert Colling, and another in 1820; then a great gap till Mr Mason's sale at Chilton in 1829; then Mr Whitaker's in 1832, on till Mr R. Booth's at Studley in 1833; then the "Roses" in 1838; Mr Wetherell then held several in 1841 and 1842, holding five in succession in as many days in the same locality, as it was difficult to get a company together. Mr Strafford began in the autumn of 1848, by the great Fawsley sale of Kirklevington in 1850; J. Booth's at Killerby, 1852; Earl Ducie's at Tortworth in 1853; and now during the last three years he has sold from £30,000 to £40,000 and £50,000 worth of shorthorns annually, averaging 1000 head per annum. Here are therefore annually distributed an immense number of valuable food-producing stock, forming many centres of fresh breeding herds, and disseminating better London. I mention this as the rent of land has increased so enormously in Cornwall as to be almost incredible, and the labouring population have been greatly benefited by opening up their county in this manner. Vegetables are sent from Cornwall as far as Newcastle-on-Tyne.

MILK.

No paper on this subject would be complete without alluding to the carriage of milk and other dairy produce, and I must question whether anything will influence agriculture more than the readiness with which railways now carry this product of the soil. I find that last year the quantity of milk carried by the Great Eastern Railway into London amounted to ,322,429 gallons, and by the Midland line 180,300 gallons; and this is but a very small portion, as I am unable to get the exact amount from the other great lines into London. There is no doubt the outbreak of the cattle plague first turned the attention of the people to the propriety of keeping cows in the country, and sending milk to London; but, necessarily, if there had been no railways this could not have been carried out. Not only has new milk found its way on to the tables of all classes in London and the other great towns, but the cream for the tables of the upper ten thousand" is now safely carried without being churned into butter in transit. Another way in which even skim milk is used is by the large biscuit factories, where the milk is required to be turned sour before it is used, and immense quantities are sent to Huntley and Palmer's (at Reading), and other great factories for this purpose. There is a very difficult problem to be solved by this sudden change of the produce of pasture land, as all the products of the land are now sent away, and nothing is left in the shape of means of making manure, as formerly. When butter was made and sent to market, large quantities of pigs were kept to eat the skim-milk, and quantities of meal were consumed, and famous bacon pigs were fatted on the land. I know that many landowners are beginning to make fresh agreements with tenants of grass-land in the neighbourhood of railways, so as to compel certain quantities of oli-cake to be consumed, or crushed bones and other manures to be drawn on to the land; and I think they will be perfectly justified in doing so. I have now gone through the chief products of the land, the cultivation and rearing of which have been much influenced by railways; and I could dilate more on all of them, but there is still so much to say, that I must leave each of these matters to be treated on separately by other members at future meetings of the Club.

OTHER PRODUCTS

I must now speak of the way in which agriculture is influenced by other products being made available for the improvement of that science. First, as to transit of coal: How much comfort has been brought to many a fireside of gentle and simple, by the introduction of railways into country districts! Rapidly the forests, woods, and hedgerow timber trees are disappearing from the face of the land, and many districts formerly supplied with firewood are denuded of timber. Coal happily comes in to cheer the long winter evenings, and all trouble from loss of timber ceases. But coal really influences agriculture in a remarkable manner. What should we have done with our steam thrashing-machines, with our glorious steam cultivators, if we could not have had easy access to coal? Even the fact of making tiles for draining, and bricks for farm buildings, could not have been carried out if coal had not been brought just where it was wanted—namely, in the cold heavy clay land districts. I much question whether anything has more influenced agriculture than the facility with which coal can now be brought to all parts of the country by railway. Again, the great facilities of bringing artificial manures, guano, and the various feeding stuffs, oilcake, meal, and foreign corn into the country have vastly enabled the farmer to carry out those improved systems of agriculture so needed at the present time.

CARRIAGE OF FOOD.

I now come to a portion of my paper which, I think, you will say influences agriculture as much as any of the foregoing. A leading engineer of the present day said recently that, "if a railway could be made through a country that would grow good grass, and ood crops for £5000 per mile, it would pay mely ;" but I regret to say, and I say it with a of great reluctance, as a Railway Director, rom the rapacity in general of landowners and , that any attempt to accomplish that fact will less. Surely when all the advantages I have ed are enjoyed by the land, the owners and of the soil should be the very first, not only to ne the promoters, but should find the land at ltural value, and aid in every way by taking , and otherwise in opening up their districts; ntil this is done, there is no chance of railway modation being much further extended. I could nagine, at the outset of the introduction of rail- that objections would be made to them, as I hat when Mr Adams, as counsel for the Liver- and Manchester Bill before Parliament, en- ured to shew that the newly-proposed mode of yance would be "as cheap, as safe, and as as any other mode in all respects," it was ly opposed by the canal companies, who brought rd witnesses to prove that a speed of 8 or 9 miles ur was utterly impossible; that the railway could only be worked by horses, and would be easily by canal boats; and Mr Harrison, one counsel for the opposition, said that "any gale nd, which would affect traffic on the Mersey, render it impossible to set off a locomotive , either by poking of the fire or keeping up the re of the steam till the boiler was ready to !" Since this time, and since the establishment lways throughout the kingdom, whenever large tations of food come into Liverpool, it is with eatest difficulty that the railway companies can heir stations. London is now become the great uting centre of the traffic of England, and almost European world, and its inhabitants are almost dent on railways for their daily trade and food. it is known that in 1866 32,439,891 tons of andise were carried by railway in England, some ay be formed of what can be done by that means sit. In addition to this 1,813,151 head of cattle arried, 7,180,845 sheep, and 1,617,587 pigs; the United Kingdom there were, in that year, 2,706,362, sheep 9,537,524, pigs 2,837,936, tal general merchandise 38,649,938 tons. Most food arrivals are in the night. The *Quarterly w* says, that "the most important are the two s meat trains from Scotland; trains which may id to have revolutionized the cattle trade of the lands. The first arrival is the daily meat express Inverness, Aberdeen, and all Scotland north of the consisting of 44 waggons filled entirely with fresh nd mutton; it performs the journey in about 30 , and arrives punctually at 11.5 P.M. The second h meat express consists of 55 waggons, usually by two powerful engines as far south as Rugby. It is pally filled with fresh butcher's meat from the west otland, and arrives at Camden at 2.40 A.M. valuable freights are despatched with all celerity to Newgate and Leadenhall markets, from thence they are distributed by noon all over London; so that the bullock that was grazing under the shadow of Ben Nevis may within 48 hours be figuring as the principal *piece de resistance* at a West End dinner." The Aylesbury meat, butter, and milk train of 20 waggons arrives at 1.20 A.M., and is followed by various others up to 3.20 in the morning. I am speaking now only of the London and North Western line to Camden Town. Cattle dealers calculate that for every beast travelling he loses 8 lb. weight per day—whether by road or railway; it therefore behoves us to see that our animals are carefully and rapidly brought to their destination. I regret to say, however, that nothing can exceed the brutality with which cattle are treated oftentimes on lines of railway; surely some means could be found, at all events, of giving them water on their journey. The *Quarterly Review* again says, that *London alone* received in 1867, 172,000 beasts, 1,479,609 sheep, and besides these, the dead meat brought by railway was equivalent to 112,000 more beasts, and 1,267,000 sheep, a legion of live stock which, ranged in close columns of 12 deep, would extend from London to beyond Aberdeen. Of wheat 500,000 qrs., 1,250,000 sacks of flour, and 771,034 sacks of malt; how much more if the odious malt tax were off!), of milk 6,309,000 gallons were delivered; potatoes, fruit and vegetables, more than 155,000 tons; of butter from the farms of Normandy chiefly, the Brighton and South Western lines alone brought 14,819 tons, and these two companies brought 11,257 tons of French eggs, or more than 3,000,000 eggs a-week all the year round. A great deal of this goes through London for distribution into other parts of the country. Manchester alone takes from 10 to 15 tons of water cresses daily; and 200 tons of new potatoes. Now, all this enormous consumption of food, all, mind you, sprung somehow or other from the land, if not all from England, being rapidly carried from the place of production to the place of consumption, has enormously influenced agriculture. It will completely change the aspect and cultivation of the country in a few years, and arable farms contiguous to railway stations, within easy reach of the metropolis or the large towns of the north, I believe, will soon be laid down into permanent pasture where the soil is at all suitable, so as to produce those perishable commodities which must have rapid transit, and corn-growing must be followed further a-field. This is rather different, I think, to some opinions, which had lately been broached at our meetings, as to ploughing up grass lands. It is too deep a subject, and would be fearfully tiring to go into this branch of the matter.

ABSORPTION OF LAND BY RAILWAYS.

I shall, therefore, pass on to the *consumption*, or I may say the *absorption* of land by railways. I find that up to the end of the year 1866, the last year that has been made up by the Board of Trade, that 9701 miles of railway have been opened in England and

Wales, and you may fairly take on an average that, including station accommodation, about 10 acres of land are taken per mile; there will, therefore, have been 97,000 acres of land taken out of cultivation, or 560 farms of about 200 acres each. This is another of the influences of railways upon agriculture. It may be said, "But a great deal of this land was moor land, or commons, or tracts of useless land for agriculture." This is not so great as you may suppose. Our main lines mostly follow population, and population has generally settled itself down in early times in fertile places. Take all the antient cities of this favoured land, Salisbury, Canterbury, York, Wells, Exeter, Worcester, Carlisle, and most others; fertile districts brought population, and they in turn spread themselves over the land. In more modern times manufactures and mining wealth have exercised influence, and cultivation followed, so that there are not many barren tracts occupied by railways in England and Wales; but when I throw in Scotland and Ireland, it still further strengthens my argument. I find the former has 2244 miles opened, and Ireland 1909, or 4153 more, which, at 10 acres per mile, is equal, therefore, to 41,530 acres, or over 200 more farms at 200 acres each. Now, against that quantity of land, which was taken from uncultivated districts, I will put all those lines made since 1866, and those in process of construction; and I think I may safely say, that over 700 farms of 200 acres each are gone out of cultivation in Great Britain and Ireland in the past 35 years. You will see here how wonderfully railways have influenced agriculture, by absorbing so much of the cultivated land of this nation; but on the other hand, by the facilities they offer for the carriage of coal and manures for the cultivation of the land and other purposes, and the delivery of the produce of the land, and rapidity of communication, they somewhat help to make up for this abstraction, if I may so call it, of the raw material of agriculture.

THE LABOUR MARKET.

Again, the labour market is greatly influenced by railways. I find from a valuable little book written by Mr Mills, called "The Railway Service," that from the last reliable source of information obtainable, there were in 1866—200,008 servants, such as ticket collectors, engine drivers, porters, guards, police, gate keepers, plate layers, and labourers, the last two classes comprising more than half that number employed on railways. Now, Mr Leonie Levi, in his remarks on the "Condition of the Working Classes," gives the following averages as their earnings:—Agricultural labourers 13s. per week, railway servants, £1, railway artificers, £1, 10s. per week. I think these [illegible] calculations; and as most of those employed as servants and artificers—to say nothing of porters, &c.—are drawn from the strong healthy agricultural population, there is a great influence at work to abstract them from agricultural pursuits. I must here also call your attention to this fact also, which strikes me forcibly, that this absorption is a great stimulus to education in rural districts, as "Hodge" finds his sons can't get a place on the railway unless they have had a reasonable education, at least as far as the three R's—"Reading, riting, and rithmetic." I hope our national schoolmasters will look to this. I am confident this creates a great desire on the part of our rural poor in the neighbourhood of railways for better education. You may see how this constant drain of young men will tend eventually to raise the price of agricultural labour throughout the country.

GENERAL RESULTS.

Now, as I have shewn how largely railways influence agriculture in every department, I have not space, and I am sure you have not time, to go further into the matter to-night. That rents have been largely raised by railways passing through districts where communication with great towns was difficult, cannot be denied; but they have given an equivalent to the tenant, by giving him increased facilities for personal travelling, and for disposing of his produce. That labour has risen, and will rise higher, cannot be denied; and I believe the increased facilities for the poor man obtaining his daily wants, will make a considerable addition also to his income, and he will therefore be bettered both ways; and the whole agricultural population must be largely benefited by railway progress. I find even costume has been influenced by railways; the long smock frock dangling about the heels of the labourer is rapidly going away to the short slop of the navvy; and the top-boot, in which the farmer rode to market, has given way to the very uncomfortable trousers. Dialect has been influenced by railways; men travel now so constantly, that peculiarities of speech are in some degree disappearing, and the tendency is to a more general fusion of races, if I may so call them, throughout the kingdom. I have no doubt it would amply pay to make cheap lines through favourable districts as regards gradients, and I have no hesitation in saying the day is not far distant when tramways will be made from town to town, and thus increase facilities for communication.

DRAWBACKS AND ADVANTAGES.

But, if railways do so largely influence agriculture advantageously, they have certain drawbacks, which they ought to be compelled to remedy. I have before alluded to the disgraceful way in which live stock is generally treated on transit, unless they are sent in horse-boxes or by other very expensive means; and I must call attention to the manner in which their embankments and cuttings and waste lands are often left—noxious weeds of every description growing upon them, and their seeds wafted away for miles over the country; in many cases the fencing in a wretched state, and the level crossings often insecure; the embankments stopping the drainage of whole districts, and the watercourses often badly attended to. On the other hand, they have been the means in many agricultural parishes of largely reducing the rates, in some instances to a fabulous extent, almost bearing themselves the whole ratal of the parish.

AGRICULTURAL MEETINGS.

Having, therefore, read so much on this subject, and finding my paper comprises such a vast area of discussion, I must bring my remarks to a close, as I am sure I have tried your patience, and know I have tried my hand in writing; yet I cannot conclude without calling attention to one subject—that of the way in which agricultural meetings and exhibitions of stock and implements have been influenced by railways. From returns which I have obtained from two of the leading agricultural societies in England, I am enabled to give you the following wonderful results:—Although a large number of visitors attended by other means than that of the railway, in 1864, at the Newcastle meeting of the Royal Agricultural Society of England, the number of visitors was 107,405; in 1865, at Plymouth, 88,036; in 1867, at Bury St Edmund's, 61,837; in 1868, at Leicester, 97,138; and this does not include the members of the Society, of whom about 2000 attend annually. The entries of live stock at Oxford, in 1839, were 350; in 1840, at Cambridge, 451; in 1847, at Northampton, 580; in 1854, at Lincoln, 950; in 1863, at Worcester, 1217; and in 1868, at Leicester, 994. The largest number was at Battersea, where 1986 were entered. And in implements the results were even more marked. At Canterbury, in 1860, there were shown 3944; at Leeds, in 1861, 5488; at Battersea, in 1862, 5064; at Worcester, in 1863, 5839; at Newcastle, in 1864, 4024; at Plymouth, in 1865, 4023; in 1866 there was no show in consequence of the cattle plague; at Bury, in 1867, 4804; and at Leicester, in 1868, 6369. At the Manchester and Liverpool Society the numbers were:—At Manchester, in 1848, 2322; at St Helen's, in 1855, 3757; at Warrington, in 1862, 15,868; at Manchester, in 1867, 33,403; and at Southport, this year, 24,242; and for stock and implements, in the same proportion. I think the following quotation from the *Quarterly Review* is as truthful as elegant:—"To whatever branch of the subject we turn our attention, it is George Stephenson that fills the foreground of the picture. The monument of his greatness may be said to be everywhere. There is not a line or a locomotive which does not bear testimony to his genius, his sagacity and his perseverance; nor is there a traveller on a railway, who saves time, money, fatigue, and anxiety, nor a consumer of the commodities which are conveyed so cheaply and so expeditiously by this new channel of communication, nor a single soul, of the many thousands to whom the system directly or indirectly has given wealth, competence, and employment, who has not reason to think of George Stephenson with gratitude for the benefits he has conferred, and with admiration for the intellectual triumphs he achieved." And I may, without fear, say that, had it not been for the steam horse and the iron road, I should not have seen so distinguished and enlightened a body of agriculturists here to-night, to be bored by my lengthy paper; but my apology must be the importance of my subject, and the confidence I have that those who hear me and those who read the paper will be fully convinced how greatly the whole kingdom has felt "the influence of railways on agriculture." I may therefore fitly close my paper by quoting the epitaph on Sir Christopher Wren, in St Paul's in relation to this great influence—"*Si monumentum quæris circumspice.*"

THE IMPROVEMENT OF THE FEN COUNTRY.

THE great modern improver of fen-lands in Huntingdonshire is Mr W. Wells, of Holme Wood House, who owns upwards of 8000 acres, chiefly consisting of fen, and whose drainage operations in connexion with the once celebrated Whittlesea Mere have had the effect, as described in the 21st vol. of the Journal of the Royal Society, of "blotting from the map of England one of its largest inland sheets of water, converting it into the site of thriving farms, and reclaiming the surrounding peat bog." Camden, writing in the seventeenth century, describes the Mere as "that clear lake so full of fish called Whittlesmere, six miles long and three broad, in a moorish country;" but Parkinson, in his "General View of the Agriculture of the County," drawn up for the consideration of the Board of Agriculture, and published in 1811, says that Whittlesea and the other Meres were then "so much filled up with mud, and grown up with aquatic matter, that they were of but very little value as fisheries, either to the proprietors or the public." Indeed, when taken in hand by Mr Wells, the Mere was principally noted for the large flocks of wild-fowl which frequented its sedgy bogs, and was dreaded by the scanty population inhabiting its borders from the pestilential vapours generated and discharged from its stagnant waters. According, however, to Mr Wells, in a paper contributed by him to a former number of this Journal, "Whittlesea Mere, in its antient state, comprised 1600 acres, but at the time when the works for its draining were commenced, the ordinary water-acreage had diminished to little more than 1000 acres. Around the shores a margin of silty deposit had been armed, which, though often dry, was liable to submerrion upon the slightest rise of the water in the Mere. Be yond this margin of silt, which varied in breadth from 50 to 500 yards, and was valuable for the excellent seeds it grew, there extended, especially towards the south and west, where the level of the surrounding land was lowest, a large tract of peat-moss, which, though generally free from water during summer, was constantly flooded during the winter. On the north and east sides the level of the surrounding land was higher—sufficiently high indeed to be cultivated by the aid of wind-mills, and approaching more nearly to the borders of the Mere, left less room for either the inner circle of silty reed-shoal, or the outer circle of peat-moss. In addition to the area contained in the Mere, the reed-shoals, and the peat-bog, there was much adjoining lowland, more or less under cultivation, which would naturally be included in any scheme for the draining of the water and waste land on which they bordered." Various schemes for the drainage of the district had been from time to time propounded, and among others Parkinson, in his General Survey, furnished a plan and detailed particulars "of a new river to be made about 20 feet wide and 4 deep, which, by carrying the Nene and other waters into the 40 feet river would drain the greatest part of the Mere itself." Sir John Rennie, on the other hand, proposed to effect the drainage by *means* of the Nene, but various considerations ultimately led to the selection of the Osue as the grand outlet for the waters. As it was impossible to obtain a natural drainage for the Mere and adjacent lands, it was not until after the passing of the Middle Level Act of 1844, and the construction or enlargement of the great marsh-land cut and other principal drains, that the work, so happily completed, was deemed practicable. In the summer of 1851, however, says Mr Wells, it was felt "that the moment for emptying the lake had arrived, and accordingly a point nearest to one of the exterior rivers having been chosen, the bank was cut through, and the long pent-up waters allowed free passage to the sea." To keep the bed of the Mere free from water, more especially during the winter months, it was deemed necessary to erect a set of Appold's centrifugal pumps, worked by an engine of 25-horse power, and estimated to raise 16,000 gallons a minute, with a 6-foot lift; and fortunate indeed was it for the spirited projector of the works that such provision had been made, for after great labour and expense had been incurred in the endeavour to adapt this newly-acquired tract of land to agricultural purposes, on the 12th of November 1852, the waters of the outer rivers, increased in volume by the heavy rain, effected a breach in the newly formed banks, and in a few hours "Whittlesea Mere was itself again." Nothing daunted by this untoward event, Mr Wells took immediate steps for repairing the breach, improving and strengthening the banks in defective parts, and again expelling the waters from its antient bed. How the work was effected y be best stated in Mr Wells's own words: "It was reckoned that 1000 acres were covered again with water to a depth of 2 feet 6 inches, and that if the pump could raise 20,000 gallons a minute it would take twenty-three days incessant pumping to clear off that amount. This calculation proved correct, and is little more three weeks the land, but certainly nono terra firma, was again everywhere visible. The bankt having been repaired and fortified, the work of reclamation, and preparing for the cultivation of the soil, was actively resumed. The completion of the main dyke, leading from a point in the high land, not very far from the present Holme Station, 3½ miles long, and averaging thirty feet in width, was an arduous undertaking, owing to the treacherous nature of the bed of the Mere, through which, for nearly 2 miles of its length, it passed. Frequent slips occurred, and continued to occur long after its first completion. From the main dyke a number of smaller dykes branched off, passing through the silty bed of the Mere, penetrated into the surrounding bog, and tapping it in all directions, brought a never-ending flow of water to be discharged by the engine. The effect of this network of drains was quickly visible. The bed of the Mere was soon covered with innumerable cracks and fissures, deep and wide, so as to make it a matter of no small difficulty to walk along the surface, while in the surrounding bog the principal effect was the speedy consolidation of its crust, which by the end of the first summer afforded, even in those places which had been long impassable, as safe and firm a footing for a man, as it now does throughout almost its whole extent for a horse." Since the memorable breach above recorded no further irruption of any serious importance has taken place; the steam pump effectually maintains the drainage of from 3500 to 4000 acres of fen land. After the stagnant water had been removed, and the land levelled so as to admit of horse cultivation, the great obstacle in the way of growing corn was the want of consistency in the soil; under the influence of the frosts of winter and the dry winds of March, it became so light that a high wind frequently wafted several inches of it away into the nearest ditch, either carrying the infant wheat plants away with it, or leaving them to linger out a short existence with their tender rootlets exposed to all the vicissitudes of climate. To remedy this defect, Mr Wells determined to cover the surface of the peat with a coating of clay. In ordinary cases the surface-dressing of peat with clay is performed without any great expense or difficulty, as a sufficient quantity of clay is found underlying the peat at such a depth as only to admit of its being easily raised. Here, however, the circumstances were totally different The underlying clay was at too great a depth to render the ordinary mode of proceeding at all consistent with economy. The resources of Mr Wells were, however, equal to the occasion. On the higher level of his park, at the distance at 1½ mile, clay was to be had in sufficient quantity for all purposes, if only the cost of carriage permitted its use. Mr Wells met the difficulty by at once causing a tramway to be constructed, and over this railway in minature the fertilising material was carried by truck after truck till the whole surface of the Mere was covered to the depth of 2½ to 6 inches,* at a cost per acre at from £15 to £16. But even this large expenditure has proved a profitable investment of capital, as land formerly worth scarcely 1s. per acre, and yet subject to a drainage rate of 6s., is now let at from 20s. to 30s. This, however, was not the only advantage obtained, for in the course of the operations necessary for the acquisition of a sufficient quantity of clay for fertilising purposes, by the removal of the high ridge of land in the centre of the park, the view from the mansion was greatly extended, and several new and pleasing features in the landscape were opened up. Nothing is more striking than the contrast between the appearance of the reclaimed land and a small tract adjoining, which Mr Wells has allowed to remain in its original state, in order to show the nature and extent of the improvements effected. The reclaimed land, unlike its sterile neighbour, is capable of producing good crops of roots, which are eaten off by sheep; the appearance of the rick-yard when the writer visited the spot in the winter of 1866-7, amply testified to the extent and excellency of the cereals; and the clayed land was occupied by promising seed layers. Mr Wells cultivates two farms of 300 acres each, about 70 acres of the 600 being upland pasture. The Home Farm of 332 acres is worked on the four-course system. Steam cultivation is extensively practised; Mr Crosbie, Mr Well's manager, asserting that the cost of the cultivation is only 4s. per acre, while he considers the work both more cheaply and infinitely better done than that effected by the use of horses, At Michaelmas. 1866, the second farm was taken in hand, of which not more than a sixth part will at present admit of steam cultivation, the rest of the land being full of large trees of from 10 to 40 feet in length, and from 6 to 18 inches in circumference the remains of a submerged forest. Many of the trees are in a good stat of preservation; the largest specimens being principally oak, the smaller kinds, red willow and othe varieties. The removal of these trees cost a considerable sum per acre. The plan Mr Wells adopts, th first time of cultivating, is to plough each field deepl by horse power, so as to find as many trees as possible and remove them, in order that steam cultivation ma be used for all subsequent operations, even to drillin and harrowing in the seed corn. The necessary implements for these operations are now in course o construction. It must here be observed, however that deep ploughing is objectionable on the claye land, until after, in the course of three or four years the clay has been thoroughly incorporated with th soil, and under these circumstance recourse is had t the cultivator, which can be worked at the season mos suitable to produce required results, and with marke benefit to the ultimate crop. Mr Wells has erecte commodious and excellent homesteads on some of th reclaimed farms, but their construction was attende with great cost, as all the buildings had to be supported on piles; and even this has not proved satisfactory, for although the highest ground has bee invariably selected for the sites, yet owing to th general subsidence of the surrounding district the wate level has in several cases been reduced below that o the foundation, and where this has occurred the head of the piles have decayed, causing the buildings to diverge from the perpendicular, and rendering it necessary in some instances, to renew the piles at grea outlay. On the estate are also some very neat labourers' cottages, constructed of wood, the walls bein formed of feather-edged boards nailed to strong posts and well plastered and finished inside, while the roofs ar carefully and substantially tiled. They are pronounce by the inmates to be most comfortable. A dim ide may be formed of the nature of the soil and the difficulties to be encountered in conducting improvements from the fact that during the period of nineteen year the land has subsided 7 feet 3 inches.—*From Gilber Murray's Prize Essay on the Farming of Huntingdonshire.*

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* A medium dressing of from 3½ to 4 inches deep is generally considered sufficient.

ADULTERATION OF SEEDS.

THE sub-committee appointed by the Royal Horticultural Society to investigate this question has issued the following second interim report on the adulteration of seeds:—

VITALITY.

So far as they have heard, no exception has been taken by any one to the statements in their former report. They understand that they are admitted to be a fair and moderate statement of facts, so far as they go. Some of the details have been explained o apologised for, and the burden and odium of other have been shifted from England to the Continent, bu the fact of their existence has not been disputed.

The minor details of manipulation your committe think of little consequence. The mixing of old see or killed seed with new, to increase the apparen quantity, is the chief evil, and the practice which you committee have found it most difficult to deal with

At first blush it seems a monstrous absurdity, not to say iniquity, that the grower should be at pains to clean his seed, and bring it to a high average of good seed, only to have the dealer put himself to equal pains to undo his work, and reduce it again; but an explanation of the peculiarities of the business has shewn how naturally and easily the practice has imperceptibly glided on from innocent and natural precautions to its present questionable state.

The crop of many of the seeds which form the staple of the seedsmen's business is always uncertain and precarious in this country. A single night's frost at a critical period may destroy the whole of the crops of turnip, mangold, cauliflower, or cabbage seed exposed to it. The seedsman thus can never calculate on the supply of the coming year. It may be a failure; and he most properly provides against this by laying in a larger stock when the crop is abundant and good. But what is he to do with the large stock so laid up in the case of a sequence of two or three good years? He uses it by mixing the product of the different years together. By-and-by a bad year comes, but, by the seedsman's precautions and forethought, a sufficient over-supply from previous years remains in stock, and the country is not unprovided, From such occasional intermixture there is a natural and easy descent to a constant lowering of the average. Troublesome questions are put if the seed is found better or worse one year than another. So it comes to be thought that it would be more easy for the seedsman, and less troublesome for the customer, if it were kept always at about the same average, and the price correspondingly lowered; and so the system of regular manipulation and tampering with the quality is introduced.

The next stage of introducing killed seed instead of old dead seed is still more easy. It is obviously much more to the customer's advantage, if the average is to be lowered, that it should be done by the intermixture of clean fresh-killed seed, rather than of old musty seed, full of the spores of fungi and the eggs of insects. So regarded, the introduction of killed seed is a boon to the buyer instead of an injury. There is, indeed, another point of view from which to look at it. The old dead seed betrays its presence; the killed seed does not; and so the purchaser is deprived of that means of testing the quality of the article he purchases.

Everything is thus thrown upon the honesty of the dealer. He fixes the price, he regulates the quality, and the purchaser is kept in the dark, and has no check upon either. This is a temptation beyond that to which the average frailty of human nature ought in fairness to be exposed.

t is not to be supposed that the existing system could have reached its present magnitude through the separate and independent action of individuals; it is the combined action of the trade which has done it. At what time t commenced, your committee have not learned, but s no modern device. Most of the present members of the seed trade have succeeded to it as a fatal heritage, and they have found themselves constrained to conform to the traditional custom of the trade, or run the risk of sacrificing important and well-established businesses, to the ruin of themselves and their families.

The combined action of the trade, which has consolidated the system, has been exerted through a trade's club, or association, something in the nature of a trade's union, which, as in other businesses, the London wholesale seedsmen have established among themselves. One of the chief functions of the association is, as your committee are informed, the regulation of prices, and the determination, by mutual consultation and advice, what kinds of seeds should have their average lowered, and to what extent it should be done.

Supported by the countenance of their fellows, and animated by a belief that by their foresight and superintendence, they are regulating the supply and demand of the kingdom, and preserving the country from the dire consequences of an occasional famine in some of the most important articles of food, it is not surprising that the seedsmen should have lent themselves to a practice which, in addition to these good qualities, had the recommendation of being at the same time so easily adapted to their own advantage.

Accordingly, the practice has taken root so firmly, and ramified in so many directions, that it now penetrates every branch of the business. Of its extent no stronger evidence can be given than the regular quotation in certain of the seed-trade lists of the prices of "nett seed," and "trio," or "ooo"—"net seed" meaning good seed which has not been adulterated or mixed,; "trio," or "ooo," meaning seed whose vitality has been killed for the purpose of mixing with good seed.

It must not be supposed, however, that there are no exceptions to the universality of the practice; the results of your committee's inquiries, confirmed, as they have been, by the trials recorded in the last report, enable them to speak to the contrary. From these, were it their cue to do so, they could name the few houses which proceed on a different system, and which are struggling single-handed against the overwhelming preponderanee of those who do not. But to do so would be by implication to reflect on others; and as the object of the Council in this inquiry is entirely of an impersonal nature—to redress a public grievance, and not to attack individuals—they feel bound to refrain from mentioning names on either side, even when the mention would be laudatory.

Of the complication and difficulty of doing away with the system, an idea may be formed from some of the following facts. Instead of purchasing their seeds from growers in the market, wholesale seedsmen find it necessary to enter into a sort of quasi-partnership, or joint adventure, with the growers. They supply them with the seeds they want grown, and receive the product from them after harvest at certain previously fixed, or proportionately arranged prices. In no other way wing by a third party) could they make sure that ds they purchase were of the kind they wanted, ds of many different species, and especially of es, being undistinguishable. Unless they knew e produce of any particular field was to be their they would neither have the right nor the t to examine it while growing, to make sure of d. As may be supposed, the bargains with growers vary infinitely; sometimes the seeds- s the owner of the soil, and the grower his ; and leases or bargains for growing seeds, ling over many years, have been entered into on ith of the continuance of the present system of cting the seed business.

in, one apology for the present system is, that it the seedsman keeps the price much more le from year to year than it would otherwise be. arges always more nearly the same price, trust- the average of years and prices equalising things course of a number of years. Your committee t think that this uniformity of price is any advan- o the purchasers, but a great disadvantage, if ed, as it is, at the cost of variation in the quality seeds. But the fact being that, whether an tage or not, the seedsmen have been to a certain acting upon it, it is plain that injury might be ed upon them if the system were suddenly put a o. If, for example, a seedsman is now in the of a course of years, of which the first half, is past, has been bad, a sudden change would e him of the chance of restoring things during mainder of his cycle of years, which, as the first ad been disadvantageous, he might reasonably to be good.

s plain, also, that arrangements made in depend- n the continuance of the present system cannot nerely at the actual bargains between the dealer rower; a multitude of engagements, sales, and ases in advance, more or less arising out of the state of things, are all in dependence. Even scharge of the servants employed in the mere nical operations of mixing the seeds would of it- casion much distress, if any change leading to it carried out suddenly and without ample premoni-

much caution, therefore, cannot be used in deal- ith a matter affecting so many and such impor- terests, and where the consequences of any error be so grave.

the same time matters cannot be allowed to re- as they are; and your committee's first idea hat the seedsmen themselves should undertake wn deliverance. They believe that these gentle- re themselves thoroughly in earnest in their de- get rid of the present system; nay, more, they e that the more respectable members of the take no advantage from it, that their profits t greater than those of other similar branches of ry, and that pecuniarily they would be gainers abolition of the system, and the substitution of a higher price for a better quality of seeds. But it is to be feared that they are so hedged in by the engagements and bargains that they have made, that it is very doubtful if they would be able to shake themselves free from its trammels by any efforts of their own. And even although they could, and were, by an unanimous resolution of the trade, to renounce all mixing of seeds thenceforward, the public would not benefit—on the contrary, they would be losers; for, instead of having the system conducted as at present, by men of respectability, who, at least, aimed at providing a constant supply, the public would find their places supplied by a lower and more unscrupulous class, who would have no object but fleecing the public as rapidly and filling their own pockets as full as they could. Any effort for good must, therefore, not be limited to the voluntary abstinence of individuals, but must be compulsory and of universal application.

It may be said that if, notwithstanding the unfavourable appearances arising from their erroneous system, the seedsman do really conduct their business so fairly and honestly, and with such attention to the welfare of the public, why should any change be made at all? Why not allow matters to remain as they are? If all did so, and all would continue to do so, and no further lowering of the averages would be practised by the retail seedsmen and small dealers, the public might be content to allow matters to remain as they are; but it is patent and notorious to all that the reverse of all this is the case. Not even all the wholesale seedsmen are content with the lowness of average fixed by their own association (see the result of the trials in last report); and the average of the stock of the small country dealers, who have been supplied with seed filtered through two or three retail hands, must be correspondingly bad. But, more than this, your committee learn from a reliable source that some of the growers themselves have begun to lower the average before it leaves their hands. It can scarcely be denied that this is a fraud suggested by the example of seedsmen themselves. The practices they have taught them they execute; and it shall go hard but they will better the the instruction. The half-educated husbandman will be slow to appreciate the difference between an admixture of lifeless seed by themselves and one by their employer, or to believe that what is fraud on their part is only estimable precaution on that of the others. Nor until the seedsman distinctly warns his customer that he is not selling "nett seed," will the public generally admit the distinction. No doubt the grower undertakes to deliver, and receives the agreed-on price for "nett seed," whereas the seedsman only charges his customers for seed of a lower average a price corresponding to its quality. If a purchaser demand "nett seed," he would have to pay more for it. But the public know nothing of such distinctions. They have never heard of "nett seed" or "trio;" and in purchasing seed they naturally suppose that they are getting the best the dealer can give them.

There is no objection to the dealer, if he chooses, having half-a-dozen different averages at half-a-dozen different prices, as a grocer sells half-a-dozen different kinds of tea, or a wine merchant of vintages; but they should be stated to be so. This may seem a digression, but it is not irrelevant; for the equivocal system which the trade have so long practised will render an extra openness for a long time necessary to recover the confidence of the public.

Your committee are of opinion, therefore, that something more than good resolutions on the part of the trade are absolutely essential; what that should be is the difficulty. Various suggestions have been made to your committee; but they have found no one plan adequate to meet the evil. An application to the Board of Trade for the appointment of a Government inspector has been suggested by some; either trials of seed at the request of dealers themselves, or unknown to them, and the publication of the results, has been recommended by others; and the passing of an Act of Parliament to render it penal to adulterate or to mix killed seeds with good seeds, is the specific of a considerable number of men whose opinion is entitled to respect: but your committee have been unable to see that any one of these steps would of itself be sufficient to meet the end. Probably a combination, or rather a selection, of them might, especially if supported by genuine and sincere exertions on the part of the trade itself. For actual adulteration (as of clover seed) an Act seems indispensable; no one will object to this: but your committee think it should also extend to the use of killed seed for mixing. No Act, indeed, that could be expected to pass would directly reach the use of old naturally dead seed for this purpose, but it might indirectly; for if the use of killed were prevented, the actual supply of old dead seed would not be sufficient to do much harm; and even if it were used, its appearance would betray its presence, and put the purchaser on his guard.

There are other points which can only be reached by introducing more generally a system of actual trials previous to purchases; and to this your committee think every effort should be directed. In some districts it appears that farmers and growers are now getting into the way of taking their half-dried grass-seed to the kiln to be dried. Whether it gets a roasting or a gentle heating merely sufficient for the purpose is, as business is now conducted, a matter of no great mportance either to the kiln-owner or his customer. It may be sold as good seed, or, if found out, will, at least, do for "trio." But if "trio" were abolished, and trials were general, the farmer would soon find his roasted seeds left on his hands; if this hap once or twice, the process would either be mad or abandoned.

It is not easy to understand how anyone who use considerable quantities of seed should ever di with this precaution. It may be that they su that the trouble of testing it is greater than it rea or that experience has shewn the experiment useless, as, from the general adoption of the average, no better quality is to be had in one than another. If the latter be the cause of the n of this self-evident precaution, it must soon cease a reason; for, as soon as the public know th quality of the seed sold has hitherto been matt regulation, they will evince a preference for tradesmen who do not adopt that practice; ar course, the demand for such will produce its n consequences—a supply. It will then become ess for the public to know whether those who profe have abandoned the old system have really done not; and the only effectual way of ascertaining t to test their seeds. It can scarcely be doubted tl the public were once alive to the importance of and if, at the same time, some simple and easy of testing the vitality of seeds were made gen known, testing would become general, and a salutary change in the management of the seed ness be effected.

Your committee have had under their consider the various modes of testing seeds which are kno them; and that which they feel inclined to recom as on the whole the easiest, cleanliest, least tro some, and most likely to be acceptable to the g public, is the placing of the seeds between fol moist flannel, and keeping them in the temperatu a sitting-room or kitchen for a few days. Thi course, is not equal to Nature's own test—a growth in the earth. It may not answer for all s but it answers perfectly for most kinds; and any that gives a good return under it, may be depend as certain not give a worse result when actually s An idea of its efficiency may be gathered from a of it made by one of your committee upon 100 of one of the sorts whose average of good seed h previous trials been found to be 75. The si method recommended gave 25 seeds germinatin the third day, 23 on the fourth, 16 on the fifth, the sixth, and 3 on the seventh—total 76; but wha plan the Council think most suitable for general your committee recommend that that plan shoul made as widely known, and its practice be as str inculcated, as possible.

PRESERVATION OF CEREALS.

E system of the Patent Silos Company's Granaries, in which this object is successfully plished, has been patented by Mr John Barker communication of Monsieur Haussmann père, or and patentee in France, who obtained the t commendation from the Imperial Commis- s of the Great Exhibition of 1867, and had con- on him the personal gold medal, on the reverse iich appeared his name, instead of the usual ic blazon.

: object of Monsieur Haussmann's invention is to ı the largest beneficial result at the lowest pos- cost, in either large or small granaries. The r, the maltster, and the large brewer will find a and important benefit in its application to the vation of sound grain of all kinds, the complete ction of parasitical insects—such as weevils, chain , &c. (generated by cereals out of condition)— storation of heated grain, &c.

: patentees claim also for their system cheap- ı the erection of granaries, as, for the same sum now costs more than double the quantity of can be stored; or, in other words, the erection rainary on the old system for storing 10,000 qrs. st as much as the erection of a Patent Silos ry for storing 25,000 qrs.

ere, from want of space, existing docks or es wish to increase the storage capacity of their ouses, without diminishing the capacity for stor- uin, the adoption of the system of Patent Silos ve them at least two-fifths of their present ware- g room for general goods, while leaving them ne capacity for grain.

company also claim economy in the expenses ng the warehousing and preservation of cereals, his system turning, airing, &c., is entirely done ith.

d cereals are thoroughly preserved from loss e, occasioned by weevils and other vermin; and, from the nature of their construction, the "Silos" are fire-proof.

Cereals are now considered perishable articles and thus holders, fearing deterioration and waste, are often compelled to sell even at very low prices. It was proved to the Imperial Commission that wheat inserted in a "Silos" in 1861, was found to be thoroughly sound and of perfect colour when examined by them in 1867.

If grain on its arrival from tropical climates is at once stored in a patent Silos, and operated upon by its simple process, the destruction of all kinds of parasites is complete and certain in two or three weeks. The trials at the Commercial Docks fully prove this. Heated graid is also, at an infinitesimal cost, cooled by this process as effectually as by the present expensive system.

Malt can be completely preserved in strength and from insects by being stored in these granaries.

Farmers can adopt this system for storing their grain, or drying it when harvested in a damp condition.

The machinery is simple and inexpensive, and can be understood and worked by a careful ordinary labourer, after a few days' experience. Farmers in a district can club together for the use of the two simple machines that are required, as they can be easily moved from farm to farm.

The principle on which the patent is based is merely the application of the simple laws of nature. To prevent and stop deterioration in vegetable or animal life, the oxygen must be extracted from the atmosphere that surrounds the article to be preserved. This object is attained by the use of the two above-mentioned machines; the one generates nitrogen, and the other, while it exhausts the atmospheric air from the Silos, helps to introdnce the generated nitrogen to take its place; and when the Silos is full of nitrogen, the process is complete.

MANAGEMENT OF FATTENING CATTLE.*

BY MR HUGH STEPHENSON, OF THROCKLEY.

not my intention in this paper to give any inite opinion as to the best system of manage- cattle for the production of beef; for I hold yond the power of any man (especially of one little practical experience as myself), to do so. I simply purpose throwing out a few practical remarks which, I hope, will lead to the thorough ventilation of the subject in question. There are so many systems in vogue at the present day, and I have often found the plan adopted by one man signally fails with his neighbour, which, I think, proves to us the great lack of sound data to go on. We want more carefl,

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he or the Newcastle-on-Tyne Farmers' Club.

experiments made by practical men, and it is the duty of every stock-feeder to make these experiments, so as to prove to himself which is the best system. Chemistry has certainly greatly assisted us, but if we do not back it out by careful experiments it will prove utterly valueless. England being essentially a beef-eating country, and considering that the demand is generally greater than the supply, it behoves us all to exert ourselves to the utmost to produce more of the staple food of the nation. We see it frequently mentioned in the papers that if the continent were thoroughly opened out by railways our markets would become glutted with foreign cattle. This I certainly do not believe, as the Continent is unsuitable for growing root crops, with the exception of mangolds, and the pastures are very liable to be burnt up in summer. Besides, the transit always damages an animal to the extent of £2 or £3; and as foreigners are acquiring more and more a liking for roast beef, I am rather of the opinion that the time is not far distant when they will consume all they can produce. The management of fattening cattle requires more skill and energy on the part of the master, and more attention on the part of the servant, than any other branch of husbandry. Every stockfeeder should have a good smattering of veterinary, so as to thoroughly understand the digestive system, and to know when an animal is healthy or not, and be able to deal with slight disorders prevalent amongst cattle. This I have found to be of great service to myself, for by keeping a few simple medicines and a lancet, and knowing how to use them, I have often saved an animal's life; as, in my instance, I should have had six miles to send for a veterinary surgeon. In considering this important subject I have taken two main heads—summer and winter management.

SUMMER MANAGEMENT.

There is a great diversity of opinion amongst graziers as to the laying on of cattle. The first and most generally adopted system is that of allotting so many cattle to a given number of acres, the animals remaining in the same field until sold to the butcher or housed for the winter. By this method there is no expense on the cattle for attendance. The second system is that of double stocking. By this I do not mean the keeping twice the quantity of cattle on the same number of acres, but putting the whole of the cattle on half the land, changing them backward and forward according as the land becomes soiled. Cattle are naturally fastidious, and prefer their food clean. In this way you are constantly giving the animals a change, and we all know that the oftener this can be done the better they go on. I have adopted this plan myself during the last two years, and found the stock did better, and I have been able to keep more on the same quantity of land. I have even changed feeding cattle on to very poor land (which was clean) for a few days now and then to great advantage. The great rage at present is "large fields." This is well enough for tillage land, but let me have fields of not more than fourteen or fifteen acres for grazing, so as to be able to keep my stock in little bounds, and change often. In every case it is highly essential that the animals should have a good supply of wholesome water. Some of you have, no doubt, been at a great expense during the past summer in providing water. I myself had to cart it for both cattle and sheep, and I firmly believe it was the cheapest thing I could give them. I do not approve of driving cattle to the water at stated times, for they drink more than is beneficial, and are liable to overload the stomach and cause inflammation. When water is required to be carted, the best way is to have a trough in the field, with a plug in the bottom, so that when the fresh supply is brought any remaining from the previous day may be let off. All pastures should be well provided with shelter in the shape of a good hedge or plantation, as in the middle of the day the cattle are very much annoyed by heat and flies, causing them to gallop, hence putting in force a greater amount of power than necessary, and consequently a waste of flesh takes place. The third system is the one least practised in this county, but, I am glad to say, is gradually gaining ground. I refer to soiling cattle in the house, either in courts or boxes. It applies most particularly to the arable or mixed farmer, and enables him, by judicious management, to cope with the grazier; as by growing certain green crops, such as winter and spring vetches, rye-grass, clover, &c., he can have fat stock all through the summer. In my opinion the greatest benefit to be derived from this mode is in the early summer months, for cattle that have not been made fat on the winter keep. We all know that by turning a feeding beast out to grass it gets a complete check, and does not improve for a fortnight or three weeks; this can only be avoided by changing the food gradually. Not having any first-rate grass land, I find this system of great benefit. It enables me to keep a larger proportion of stock, and of course this means more manure, and hence more corn, and, best of all, more money in my pocket at the year's end. A farmer requires to make preparations for this system of feeding. He must provide himself with a sufficient quantity of straw for litter, or he may use with great benefit dry peat or any other vegetable matter. He must also have his food coming forward for regular use in regular stages, so as to ensure a continuous supply. It should be cut fresh at least every morning. Care should be taken to give it in small quantities, so that the animal may eat it at once, nothing being left to cause fermentation. I find it a good plan to place a little common salt either amongst the food or as rock salt in the manger, as it gives a tone to the stomach and assists digestion.

THE WINTER MANAGEMENT.

This division applies especially to arable farmers, as they generally produce their fat cattle during the winter season. All cattle forward in condition should l not later than the first week in October, as t period the grass has lost all its feeding and the animals just wander about the fields helter from the cold winds. For a few days to their removal they should be given roots fter kinds to accustom them to the change. t important point that strikes me is that of commodation. Now, there is a great differ- ppinion as to which is the best of the three generally adopted—viz., open courts, stall, -feeding.

OPEN COURTS.

old-fashioned farmers cling to this style, , I suppose, their forefathers did so ; but there r farmers who would like to change, but do : their way clear to expend the money them- This brings it to a landlord's questions and bt it does belong to the landlord to provide : buildings for his tenants. It is a very difficult to alter old buildings, and I have often seen noney wasted in endeavouring to remodel han would have built new ones ; and I am notice that even in the erection of new ones s a great lack of proper accommodation and of feeding stock. The outside of the building e beautiful, but no attention seems to be paid internal arrangements for the welfare of the or the advantage of the tenant, who, I hold, is t person to be consulted, as he generally has to terest for the capital invested. For fat stock ourts are not suitable, the animal has too much e, and the temperature being cold and very ar, it requires more food to sustain the body ep up a natural heat. By the food being laid n cribs, a great deal is wasted, especially in or wet weather. There is a system still adopted st a certain class of farmers—viz., that of filling ibs every morning with turnips, which lie ex- to the weather, and are cut at intervals during y with a spade or some other implement. The easily imagined ; and the loss of the present crop will prove a blessing if it teaches them my. Another important item attending feeding n courts is the waste in the manure. An opinion revalent amongst farmers is, that to get their straw d down and made thoroughly wet with rain water that is required to constitute manure. Here is a mistake ; for manure should not be valued by ity and quality, and the only pure manure is the and urine of the animal, with just a sufficient it of straw to absorb it. I often see a black flowing away from a fold-yard, and on exami- find it is nothing less than the strength of the re being carried away by the rain water. By ing the buildings this great evil is materially ed.

STALL FEEDING.

re is a great deal to be said in favour of stall- g—in a year like the present, when litter is scarce, and all will be required to fill the stomach—a great saving is effected, for if the stalls are boarded and properly made, the cattle may even do without bedding. As far as my own experience goes, I find that small heifers do well in stalls but when, you come to heavier weights, especially bullocks, the cramped position they are kept in tends in a great measure to stop their growth, and, besides, the urine is very difficult to get away from bullocks. The saving of food is, however, very great as compared with feeding in the open courts, as the animal is not exposed to rough weather, or to being knocked about by its companions, and perhaps deprived of its legitimate share of turnips, &c.

BOX FEEDING.

This system is acknowledged by most practical men to be the best, both for the well-being of the animal and the quality of the manure. It must be quite plain to any thinking man that an animal allowed to use its own pleasure in lying or standing, and also in eating, must feed quicker than in either of the other systems I have noticed. In going through my boxes at night when all is quiet, I have often been struck with the different postures of the animals—some you would think were dead, lying stretched out at full length. This is comfort, and the more comfortable an animal is kept the better it will pay. Ventilation should be properly attended to ; there ought always to be a circulation of pure air through the building. I have a range of twenty boxes under one roof, which were put up by the Greenwich Hospital Commissioners, under the able superintendence of their receiver, Mr Grey of Dilston, which I consider second to none in this district. There is an opening at the eaves the whole length of the building, which allows the fresh air to enter, and drive the foul air up to the roof, where it goes out about three feet from the top, at an aperture formed by the slates being slightly raised. This I find to be a thorough system of ventilation. The cold air does not blow upon the cattle, as it comes in above them, and there is always a fresh sweet odour in the place, even the middle of summer, I have often observed that cattle tied by the neck seem to stand still in feeding after a certain time, but on changing them into boxes the effect was marvellous, and I now invariably put all my cattle into a loose box for a month or six weeks before selling them. With regard to the manure made in boxes, I find wherever it is applied alongside of the ordinary manure, there is always a marked improvement in the crop.

FEEDING.

I have given you (as far as time will allow) a short account of the different systems of housing—and, as the feeding is the most important point in management, I must say a few words on this head—dividing it into two parts, ordinary and extraordinary. It is only within the last few years that farmers have troubled themselves much about it, but it has been so gradually forced upon us by the ever-increasing consumption of beef, that we are now compelled to give this matter our serious attention. Nearly every farmer has a system of his own, and it would be great presumption on my part to say which is the best, for, as I remarked in the opening of my paper, the number is legion, and it is quite beyond the power of any one man to test them all. Every feeder starts on the same great principle, which is to make most money in the shortest time. First of all, I will give you the plan I adopted last winter, and I assure you it cost me a great deal both of time and money in making experiments to gain this information, which, however, I dont's say I'll stick to, as I am still searching for more light, and will gladly change as soon as I find out a better method. From allowing 100 to 130 lb. of roots per day to an ordinary-sized animal, I reduced this quantity to 60 lb., given in three meals—morning, noon, and night. The turnips were just sliced in the ordinary way, and given raw, but fresh. About nine o'clock I gave a feed of 2 lb. of pure linseed and ½ lb. of bran to each beast, and the same between two and three in the afternoon, straw *ad libitum* was provided, and we offered them water for a while, but finding they did not care about it, it was discontinued. According as the animals improved another lb. of oil-cake was added per day, which they got until sold; I also give a little salt. Now, I have no doubt some of you gentlemen will scarcely believe me, when I say that for under 7s. per week, I can feed an ordinary fresh beast fat in from ten to twelve weeks. In estimating the cost I allow £12, 10s. per ton for linseed cake, £6 per ton for bran, and 8d. per cwt. for swede turnips, which is a high consumptive value—4d. per head per week for attendance, and value against the straw consumed. On this system I fed upwards of 100 cattle last winter, varying from 40 to 70 stones dead weights. I had just 50 acres of roots to commence with, and besides cattle I had 400 sheep, 200 of the latter being sold fat in April. I quote this, gentlemen, to prove to you the utter foolishness of giving such large quantities of turnips. You must all know that in every 100 lb. of turnips you give to an animal, there are about 90 lb. of water, and only 7 lb. of available food, being scarcely capable of producing 1 lb. of meat. I know several farmers who insist upon saying an animal won't feed unless it receives 1½ cwt. of turnips per day—these men waste the most expensive food we have, and keep the poor animal in a constant state of diarrhœa; it certainly gets dry food in the shape of straw, but it is unable to eat it, having overloaded its stomach with turnips. There is far too much hap-hazard in feeding; many have an idea that by simply feeding the animal's stomach and keeping it full, it must feed: there never was a greater mistake, for it is absolutely necessary for the well-being of the animal, that at certain times its stomach should be almost entirely relieved of food. I once strongly advocated the principle of making most of your corn walk away in the shape of beef and mutton, but on thoroughly going into the matter, I found it more profitable to sell my corn and buy pure linseed cake. I cannot refrain from saying a few words about this cake. A few years ago it was thought impossible to manufacture a pure cake, through being so soft, but this has been proved to have been only policy on the part of the manufacturers, who found the profits larger in producing a mixed cake; and what will some men not do to make money? No doubt consumers have been, and still are, gulled to a fearful extent. It is too much the case amongst farmers, if one man will only sell them cake at 10s. per ton less than another, they buy, without at all considering the quality. There is one thing worth remembering in buying linseed-cake; never purchase from a manufacturer who makes his profit from the oil, as there are two sorts ot linseed, one containing a much larger percentage of oil than the other, but very much inferior in feeding quality. I know from experience that, until I was able to procure pure cake, I could not obtain the results from feeding cattle which I have enumerated. I have tried all the different descriptions of cake, and, after carefully them in a practical way, I have been forced to the conclusion that pure linseed-cake, though by far the most expensive, is cheapest in the end for fattening cattle, especially when only receiving a small quantity of roots, as it is of a laxative nature. I use largely cotton and rape-cake—but for store stock. There are several ways of preparing food for cattle, such as steaming, pulping, and chaff-cutting. The first, or steaming, is a system I never tried, but I have visited several farms where it was in operation, and my idea is that the extra labour attending it runs away with any profit which might be derived. No doubt it originated in the idea that by giving the food warm, and in a state ready to digest, the animal would feed quicker; but when we take into consideration that, in whatever shape the food enters the stomach, it must be returned back and thoroughly masticated before it is of any use, this theory is upset. Pulping and chaff-cutting must of necessity go together. There is a great saving of food by cutting straw, or inferior hay, and mixing it with pulped roots, or any artificial food, as the animal eats in this way what it would otherwise refuse. I have found this plan answer admirably, if the mixture is given fresh, but I do not see the advantage of allowing it to lie for three or four days till it gets sour, and the poor animals are then forced to eat it in this unwholesome state.

Now, gentlemen, the next and last heading is far the most important to us all at the present time, as I don't think that any farmer in Northumberland has more than a quarter of a crop of turnips. In my own case, I sowed 100 acres, and if all I have were placed in a 20 acre field the crop would be nothing extraordinary. It resolves itself into this point, what can be got as a substitute? I know a great many farmers are meeting the evil in the face by keeping less stock, which has had the effect of glutting our markets with beasts to an awful extent during the past three i. I never like to shirk a difficulty, and especi-ıe which affects my manure producers; so I tarted with my usual quantity of stock, under ıpression that I will be well repaid for any expense by receiving an increased price in ring from the butcher; and, after six week's find I shall be able to keep me stock without difficulty. In the first place, the few turnips I re all swedes, and, as I do not purpose giving them to the sheep, as I consider they can do wanting them than my horned stock, I shall he whole for the use of my cattle. Giving up a of 60 lb. of roots, I have 20 bullocks in boxes ng 40 lb. per day, and to fill up the vacancy, straw cut with the chaff-cutter (having erected l engine this autumn for driving); no doubt hay be better, but, at present prices, is too ex-e. The cut straw is given in two meals, and with the linseed cake and bran in the same ties, as last winter—boiling water being poured he cake and bran first, just sufficient to give it a ency; after cooling it is thoroughly mixed with ıaff and given to the animals. They also : dry straw in their racks, and water, which rink very readily. These bullocks have been on d for about six weeks, and I never had cattle etter; in a month's time they will be quite fit butcher, varying from 50 to 60 stones each, sting about 7s. per head per week. I have also fers receiving 20 lb. of roots per day, with ne amount of cut straw, but 1 lb. less of cake y, with straw and water same as bullocks, cost-6d. per head per week. Besides these, I have ocks and 10 heifers not so forward in condition, d to feed off in April or May. These are receiving traw, of which they consume a large quantity, of linseed and 1½ lb. of cotton cake, with *d libitum*, costing 3s. 6d. per week, including 1s. w; none of these cattle ever go out of the So you see, gentlemen, I have two or three t experiments going on, which I shall fairly winter. All the cattle are healthy, and seem s well as any I ever saw. If this system of turns out profitably, it will be the means of sowing so many turnips next year, for they are t expensive and precarious crop we grow; and, n light lands where we can strip the turnips, on the remainder with sheep, it is very ques- whether some other green crops would not er. There are other feeding stuffs, such as orn, barley, pea, and bean meal, rice, sugar, worthy of consideration; but as the limits aper will not allow of my going thoroughly n, the simple mentioning of them must suffice. ff-cutter is undoubtedly the machine which exclusively used this winter. Every farmer ought to possess one, as it saves fully one-third of straw; and if we have a severe winter, straw will be very valuable before the spring. Now, gentlemen, I have endeavoured in this paper to give you principally my own practical views as to the management of fat stock. I have kept exclusively to the practical, because I know most farmers have a great dislike to scientific papers, especially from young men who have been at Cirencester, the prevailing idea being they know nothing about agriculture; but my motto is "Practice with Science."

A few things strike me which ought always to be remembered in the management of cattle:—Never buy a bad bred beast; 2dly, Buy them cheap, and they are half sold; 3dly, Feed them on the best of food; 4thly, Give them their food regularly, and let it be clean and wholesome; 5thly, Keep them warm and comfortable; And lastly, Sell as soon as they are good beef, as that is the time the farmer gets most profit out of them.

In bringing these remarks to a conclusion, whilst deeply sensible of my utter inefficiency to do anything like justice to the great importance of the subject under review, I should wish to impress upon all present the growing and increasing proportions of the principles and practice of agriculture. Without presuming to be either obtrusive or dictatorial, you will permit me to observe, that never in the history of the present century has agriculture attained so prominent and dignified a position as it occupies to-day. Vieing as it were with the sister branches of manufacture and commerce, the science of agriculture has of late years made a very rapid and important advancement. We can no longer afford to follow in the old beaten track of our forefathers, the day for "rest and be thankful" policy has passed and gone, and it is now highly incumbent upon us to avail ourselves of the discoveries and inventions of science and art, with a view to the further progress and development of this increasingly important vocation. If it be true, as Professor Wilson observes, that he is only a true patriot, "who makes two blades of grass to grow where one only has grown before," then we claim for agriculture the very foremost rank among the pursuits of the country. We venture to entertain the hope that, in succeeding years, by the introduction of machinery (to the reduction of the cost of manual labour), by a thorough and searching inquiry into the nature and qualities of the various soils (in order to the application of suitable manures), by a more general attention to the fundamental principles of the science of agriculture itself, and last, though not least, by more earnest and continuous application to, and perseverance in, the work which in the providence of God has been assigned to us, a future will be opened out, as far exceeding the past as light excelleth darkness.

THE FAT OF CATTLE.

IN an article in the *Saturday Review* on the Meat Market, we find the following remarks, not without their value to farmers and breeders:—There has been a very marked advance on one article of commerce—namely, tallow—which has risen from an average value of about 42s. per cwt. at this season of the year, to the high price of about 52s. per cwt. for Russian—the consols of the tallow market. We do not learn from the market reports that there has been any increase in the consumption of this article, nor are we told of any great falling off in the quantity imported. The inference we draw is, that the rise has taken place in consequence of the deficiency of the home supply of fat. And the lesson it teaches is, that in ordinary years we send our sheep and oxen to market in too fat a state. That is to say, we produce fat at home which goes into consumption in the form of tallow at a much greater cost than we can buy the tallow for in foreign parts. Russia, Australia, South America, Africa, can give us almost unlimited quantities, and it is an article which can be transported without injury to itself from those distant regions. This year's experience seems to teach us that the material employed to produce this fat in our islands could be converted into good, though leaner beef and mutton, with more profit to the country. It is only in the ox tribe that the fat is in large measure inseparable from the lean, for in the ox the fat and the lean are intermingled in the structure of the animal, while in the sheep the surplus of fat, if we may so term it, is formed in the interior of the carcase; and in the pig it is laid on the exterior. Certain proportions of fat and lean are required to make meat palatable, and also to make it useful food for man; but there can be no doubt that an immense quantity of fat is developed, which is useless, except for the melting-pot. Now, it does seem absurd that we should go on producing here, at a high cost, fat which we can get cheaper from foreign parts in a convenient form for use, while we do require leaner meat, which we cannot obtain from distant countries in a palatable form, although all the resources of science have been vainly employed in attempts to convey it, and we can grow leaner meat in greater quantities by reducing the production of fat. Although at this time there is a greater difference in price than usual between the meat of the fatted and that of the unfatted animal, yet those who want the fat meat, and can afford to pay for it, can have it. This year the number of animals brought to market has been about the usual one, but on account of the scarcity of food, they have come in remarkably lean condition. In future years, with the ordinary supply of vegetable food which is always converted into meat, the number of animals may be increased, if they are sent to market in the same moderate condition as at present; or the numbers of this year may not be exceeded, in which case the animals would be increased, if they are sent to market in the same moderate condition as at present; or the numbers of this year may not be exceeded, in which case the animals would be fed to that degree of fatness which supplies the melting-pot and brings down the price of tallow. There can be no doubt, we think, that the economy we ought to practise is that of increasing the number of animals, while the fatness of each individual is reduced.

Notes and Queries.

X. NUMBER OF USEFUL PLANTS.

A GERMAN author states that the number of useful plants has risen to about 12,000, but that others will no doubt be discovered, as the researches yet made have been completed in only portions of the earth. Of these plants there are 1350 varieties of edible fruits, berries, and seeds; 108 cereals, 37 onions, 460 vegetables and salads; 40 species of palm; 32 varieties of arrowroot; and 31 different kinds of sugar. Various drinks are obtained from 200 plants, and aromatics from 266. There are 50 substitutes for coffee, and 129 for tea. Tannin is present in 140 plants, caoutchouc in 96, gutta-percha in 7, rosin and balsamic gums in 387, wax in 10, and grease and essential oils in 330; 88 plants contain potash, soda, and iodine; 650 contain dyes, 47 soap, 260 weaving fibres; 44 fibres used in paper-making; 48 giving roofing materials, and 100 are employed for hurdles and copses. In building 740 plants are used, and there are 615 known poisonous plants. One of the most gratifying developments is, that out of 278 known natural families of plants, there are but 18 species for which no use has yet been discovered.

XI. MODEL COTTAGE.

In reply to a correspondent, we have to state that there is a Society which concerns itself with the cottage question—namely, that in Arundel Street, Strand, London. This society, under the name of the "Cottage Improvement Society," has done a great deal to disseminate information on the various aspects of the question, and to make its offices a species of focus or centre where information of every kind in connexion with the subject may be had. We may state that, with regard to agricultural cottages, the Society have proved that a *pair* of cottages can be built for the sum of £175, containing kitchen, wash-house, and three bedrooms. In fig. 1 we give the elevation of a pair of cottages erected under the auspices of the Society for £225, but including fittings and fixtures of all kinds. The elevation is so designed that it looks like a single cottage, the entrances being at the sides—fig. 2 is the plan. The internal arrangements are most complete, comprising a wash-house which contains a sink, pump, boiler or copper, fire-place, and an oven, a place for a ton of coals, and dresser, with shelves, &c. The living room is spacious,

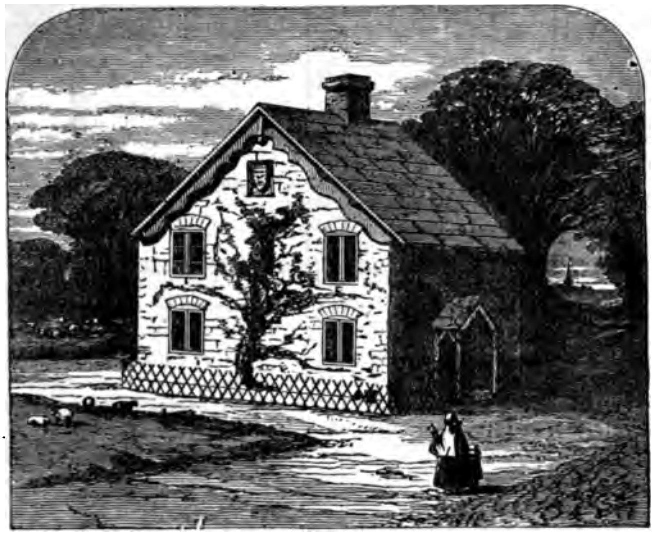


Fig. 1.

and contains ranges, oven, and boiler; a large pantry and vegetable-house. There is also a parlour which might be converted into a bedroom, and in the second storey there are two bedrooms with clothes' closets attached; each bedroom has a fireplace.

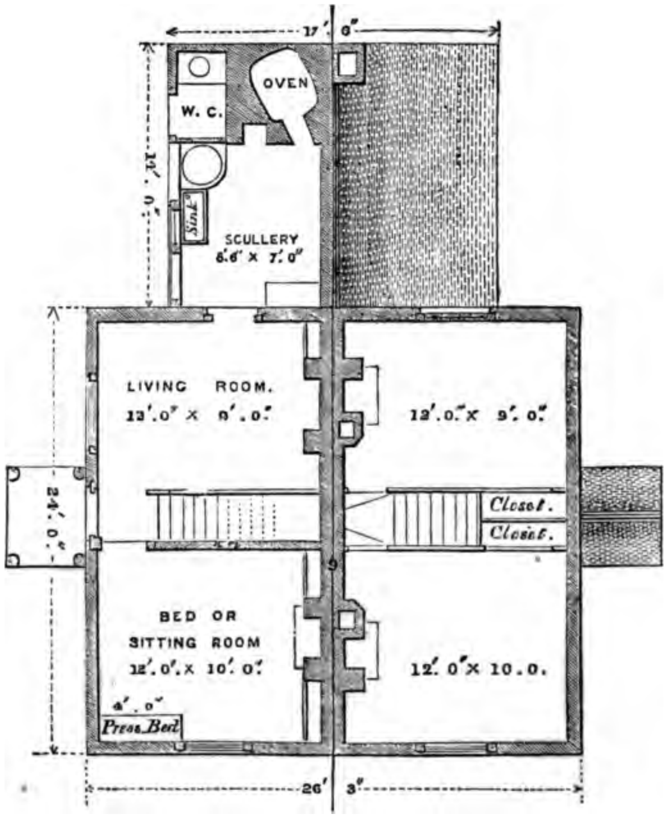


Fig. 2.

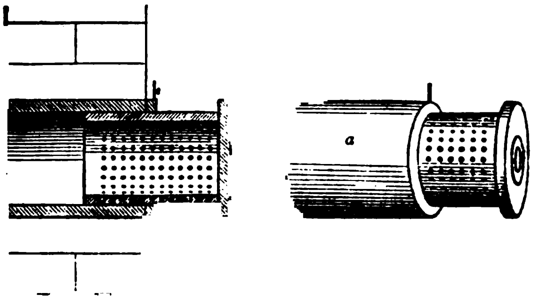


Fig. 3.

[illegible] VENTILATION OF STABLES, ETC.

No system of ventilation can be perfect unless [illegible] essentials are secured: first, the admission of fresh, and, second, the withdrawal of foul air. Hence the reason why so many attempts have been quite unsuccessful, in which one only of these requisites have been attended to. Of these two, generally the second has been thought of only—namely, means by which the foul air can be withdrawn. There are various modes of admitting fresh air to the interior of a stable. Some advocate the plan of admitting it near the head

ll, at or about the level of the horses' head;
nd we are inclined to think with better reason,
e of admitting it at the wall opposite the head,
r near the level of the floor. Figs. 3 and 4
Looker's ventilators for admitting fresh air—
ing a perspective sketch, fig. 4 a section. The
e upon which this operates is very simple. The
the part *b* is pulled out from its seat, the greater
umber of apertures exposed to the atmosphere,
consequence, the larger is the amount of air
d to the tube, and by it to the interior of the
We shall return to the subject in another

II. BAROMETERS AS INDICATORS OF THE WEATHER.

ndicators of weather, barometers have fallen
hat into disrepute; and yet, when used in
ion with other instruments, they are very use-
foretelling what the probable state of the
r will be within reasonable limits. In many
ey are to be found hanging by themselves, and
y ever referred to, on account of their supposed
to error. The usual weather marks upon
l of a wheel barometer very often deceive the
ial observer.

rometer indicates only two of the conditions
hich weather changes depend—viz., weight of
dependent upon moisture, and disturbances in
osphere more or less remote, according to their
e.

ertain latitudes, a sudden fluctuation of the
y is always to be regarded as an indication of
ather; but it is not necessarily an indication of
lthough a violent disturbance of the atmosphere
rally attended with more or less condensation
noisture which it holds in suspension.

barometer were sufficiently delicate in its opera-
shew the disturbances which take place at a
istance from its location, and which take place
id succession, at from twelve to twenty-four
revious to heavy storms, it would be far more
than the ordinary instruments, which, although
e sensitive to remote disturbances, do not shew
ith sufficient plainness to be easily observed in
inary method of reading the instrument. It is
inconvenient to make such observations with
nt frequency to take account of the rapid and
variations dependent upon such remote causes,
ey usually elude observation. Recent experi-
however, go to shew that they are most im-
t in their relations to weather phenomena.

frequently the case that when air is in the
ygrometrical condition, that the mercury in the
ter will move in different directions within an
l of three hours, proving that weight, or, more
y, pressure of the atmosphere, does not depend
he moisture held in suspension solely, but also
e waves produced at a distance and communi-
rough air, very much as winds at sea produce heavy swells very far from the place where they act directly upon the water.

Changes in weather depend upon atmospheric disturbances, and the nature of the change depends upon the temperature, and the hygrometrical condition of the atmosphere. A barometer used together with a thermometer and a hygrometer, and the indications of change shewn by the barometer, interpreted by the indications of the two latter instruments, will be found more reliable than is at present currently believed.

XIV. THE INCREASE OF DISEASE AMONG DOMESTIC ANIMALS.

A very cursory examination of agricultural statistics and reports of different organizations, relative to the diseases of domestic animals, brings prominently to view the fact that these diseases are on the increase. The causes which engender this augmentation of disease are an interesting and important subject of study. Some light may be thrown upon it by a consideration of the origin and progress of human diseases, with which the diseases of animals are in many cases identical, and in other instances bear so strong a resemblance that the principles of general pathology may be considered as equally applicable to both.

The medical faculty are generally agreed that, in the human race, diseases originate largely from the artificial habits of civilized society, which, although many of them really conduce to health, as cleanliness, the absence of the peculiar privations attending savage life, &c., are attended with practices contrary to the laws of health.

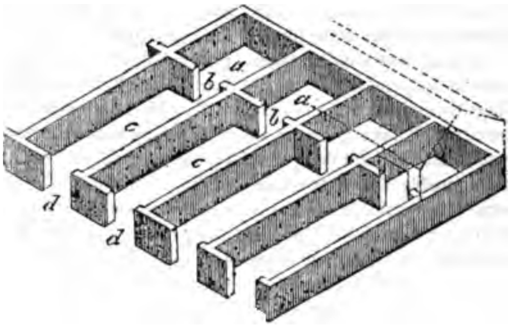
The congregation of people in large cities, high seasoned food, artificial stimulants, sedentary habits, &c., are fruitful causes of disease. Among the very poor inhabitants of large towns, the want of proper ventilation, light, and food, adds to the catalogue of "ills which flesh is heir to."

If we examine the mode of feeding, stabling, and breeding cattle, we shall find some of the same causes of disease in their improper management. Dark, ill-ventilated stables; too stimulating and concentrated diet; the crowding of animals in large herds and pens, are countertypes of the causes of human disease. These causes are well recognized among breeders, and we shall therefore not dwell upon them. Our object is to call attention to a fact which has its analogue in the culture of vegetables. The diseases which have from time to time made such havoc with the potato, the hop, and other plants largely cultivated, have been ascribed, to over-cultivation. Not that over-cultivation is the direct cause of disease, but that the constitutions of the plants in question have become so weakened by it that they have thus been rendered susceptible to causes which otherwise would be resisted.

The practice of breeding stock in order to develop particular qualities, is, we believe, fraught with danger beyond a certain point. It is all very well to have horses that can trot in 2:30; hens that lay but will not set; sheep that will furnish a large fleece of a desired quality, or cows that yield thirty pounds of milk per diem, if these qualities can be obtained without the risk of initiating diseases that rage indiscriminately among, and ravage our flocks and herds, destroying alike good and bad. We do not believe that this result of the inter-breeding, so much in vogue among our celebrated breeders, has attracted sufficient attention, or that the constitutional peculiarities and idiosyncracies of highly bred animals have been sufficiently observed. Now that the attention of the world is attracted to the epidemics and contagions that are making such havoc, raising the price of food and rendering people suspicious of its effect upon the health of mankind, this point demands immediate and thorough investigation.

XV. MANAGEMENT OF CLAY AND HEAVY LANDS.

The great secret of success in the management of land of this kind lies in the taking advantage of every available moment for working the land when favourable weather exists, that is, when the soil is not too wet, in which case, if worked at all, the adhesiveness is rather increased than otherwise. Nor, on the other hand, when it is too dry, as there is an increased cost in working it. A judicious farmer knows well the happy condition in which the soil can be worked to advantage; and when this is attained every effort should be made to put the most steady work upon the land. At one period the very fact of a soil being heavy, was enough to stamp it as one of the most valuable, especially for wheat and bean crops; but clay soils are often poor, or comparatively so, and abound- [illegible] and turning. The [illegible] utmost knowledge of the farmer to treat them carefully. It is scarcely necessary to say that heavy adhesive clay lands require to be well drained; possibly it is not too much to say that they cannot be overdrained. The drains should be deep, and the intervals not too wide; and the action of the drains will be greatly aided, or, at least, supplemented, by throwing the surface of the land into narrow ridges with good deep water furrows; the great object being to keep the land as free from moisture as possible, allowing the frost and atmospheric influences so to act upon the soil, that it will be in a pulverized condition when the seed time arrives. The more thoroughly the air can penetrate the soil the better the condition, hence the absurdity of ploughing worked fallows in wet weather, for the clods turned up get so baked and hardened by the action of the sun that little or no air can penetrate the mass. The cropping of heavy clay lands is now greatly modified; formerly they were scourged by a succession of crops of wheat and beans, the land being allowed to rest, or subjected to a naked fallow. By the introduction of the green crop fallow, aided by the improved modes of culture, clay soils can be, and are now placed under a more extensive rotation and with greater advantage, but when the strongest clay soils are met with, possibly the the best way to use them is putting them under permanent grass.



XVI. STOCK FEEDING ACCOMMODATION.

The accommodation for feeding of stock may be divided into four classes: First, "stall or byre; second, "hammel;" third, "box;" and fourth, "courts and sheds." In Note v., p. 747, we have given a few remarks upon the first of these, we now give here a few upon the second, or upon hammels. These consist of an open court with a shed at one side, communication being kept up between the two by a large door. The arrangement is shewn in fig. 1, where *a a* are the sheds, 14 feet by 12, with doors, *b b*, 5 feet wide; *c c* the courts, 14 feet by 18; *d d*, turnip troughs; *e e*, the dunging gates. The doors, *b b*, are placed at the sides of the sheds, so as to afford a large protected corner. Each hammel, of the size above given, will afford space for two large or three small oxen. For four large oxen, and where the dung is to be carted from the courts, the size should be 30 feet by 18, the gate 9 feet wide. But the smaller sized hammels should be used, according to Mr Stephens, as their advantage—and it is a great one—consists in assorting the cattle according to their age, temper, size, and condition, and in giving them liberty in the fresh air. They should not only be much smaller than courts, but only contain two large oxen or three small ones. The height of the walls of the sheds to be 9 feet, of the court walls 6 feet. The point is much disputed whether the stall-feeding of stock in byres is better than the feeding in hammels. Mr Stephens, who advocates the hammel system as the most natural, and as that most conducive to the health of the animal, thus discusses the point:—"Some facts have already been decided regarding the comparative effects of hammels and byres upon cattle. Cattle are much cleaner in hammels than in byres. No doubt they *can* be kept clean in byres; but not being so, there must be some difficulty incidental to byre management, and it consists, I presume, in the cattleman finding it more troublesome to keep the beasts clean in a byre than in hammels, otherwise, the fact is not easily to be accounted for, for he takes no *special* care to keep beasts in hammels clean. Perhaps, when cattle have the liberty to lie down where they please, they may choose the driest, because the most comfortable, spot; whereas, in a byre, they must lie down upon what may be, and which they cannot see, behind them. There is another advantage derived from hammels: the hair of cattle never scalds off the skin, and never becomes short and smooth, but remains long and mossy, and is all licked over, and washed clean by rain, until it is naturally *cast* in spring, and the advantage is felt by cattle when sent to market in winter, when they can withstand much more wet and cold than those which have been fed in byres. A third advantage is, that cattle from hammels can travel the road without injury to their feet, being accustomed to be so much upon their feet and to move about." Mr Stephens quotes from a prize essay, by Mr Boswell, who says that "hammels ought never to be used unless when the climate is good, and the accommodation of courts dry and well sheltered, and, above all, unless when there is a very large quantity of litter to keep the cattle constantly clean and dry." Where these desiderata are attained, Mr Boswell says "that he is convinced, not only from his own experience, but from the unanimous opinion of practical men, that there is no point more clearly established than that cattle improve quicker, or, in other words *thrive better in* open hammels than in close byres." On the other hand, we deem it right to give a testimony in favour of stall feeding, and this from the high authority of Mr Caird —"A considerable comparative experience has convinced me that no other method will give equal accommodation for the same outlay, whilst I am persuaded that, in regard to economy of food and litter, facility of labour in attendance, health and progress of the cattle, and systematic arrangement altogether, stall feeding is superior to any other that has yet come under my notice. The progress of the soiling system, or house feeding of cattle in summer as well as winter, will lead to a more general recognition of the superiority of stall feeding, both from necessity of economizing litter, and the advantages of not wasting the labour of the cattle feeders and others in traversing unnecessary distances attending the stock."

XVII. STOCK-FEEDING BOXES.

In the last Note and No. 5 (Stock-Feeding Accommodation) we gave descriptions of two modes of affording accommodation for stock. We now describe a third mode—namely, that of "boxes." The box system of cattle-feeding may be described to be a series of loose boxes, in each of which a single animal is confined. The space allotted may either be excavated so as to make a depression in the ground a certain depth, or brick or stone walls may be built, making the required enclosure. The litter, dung, &c., is not removed, but is allowed to accumulate, the animal pressing it down in a compact heap, which is removed as desired. The crib, or manger, is made to rise and fall according as the litter accumulates in height, or is decreased by removal. Passages are provided between the boxes, by which the food is supplied to the cattle, and the dung wheeled out when required. In fig. 1 we illustrate a mode of erecting boxes of home-grown timber, in which *b* is the double range of boxes, with feeding-passage behind, *a* being the turnip-shed. The size of the boxes is 10 feet square; some make them 7 by 12. The width of the passage is 6 feet. The boxes are divided by hurdles, as shewn. The depth of the dividing walls upon which

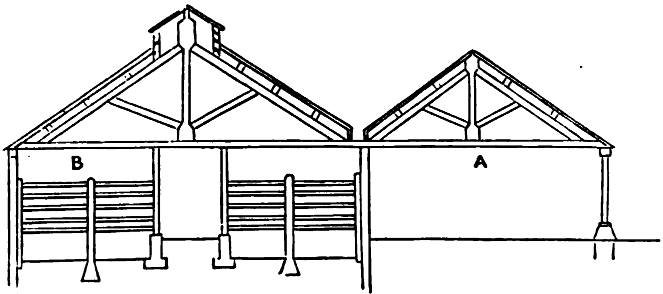


Fig. 1.

these are placed is 3 feet. As on the question of stall and hammel-feeding, so in that of "box" feeding, as compared with other systems, there is much diversity of opinion. On the subject of cattle-feeding, or "soiling," as it is otherwise termed, in "boxes," Mr Ewart has the following remarks:—"The generally imperfect management of fattening stock, and the negligent preparation of manure, so prevalent in times past, cannot enable the husbandman of Britain to meet without diminution of capital the unrestricted competition of foreigners in the British market, in every kind of produce of the soil, which he will henceforth have to encounter. The excrements of a few half-fed wintering cattle, and the litter of an open yard exposed to the alternate effects of rain, wind, and sunshine, will do little in raising such grain crops as to enable the British farmer to maintain, much less to promote, a profitable employment of his capital, and of native industry in the cultivation of the soil. . . . The essential conditions on which the fattening of cattle can be obtained with the greatest economy are, warmth, quietude, wholesomeness of atmosphere, and cleanliness. And of all accommodations that have probably ever been invented for the feeding of oxen, none has so completely insured the principal object of converting the vegetable productions of the earth into food for mankind in the shape of flesh, as the plan of feeding in boxes or loose stalls, first suggested by Mr John Warner of Tremingham, in Norfolk, nor does any plan more completely fulfil a secondary, but scarcely less important object—the raising of manure of the best quality with the greatest economy—than the accommodation alluded to. There cannot exist in the mind of any individual who may have witnessed the feeding of cattle in boxes properly carried out a doubt of its being a most effectual mode of providing due shelter, perfect freedom from molestation, and complete comfort to the animals—all conditions most essential to rapid thriving; nor can any one behold the accommodation without being thoroughly convinced of the great economy in collecting the egesta, and preserving it in the very best state for its purposes, and yet without the least exhalation of effluvia. Whatever may be supposed, those who have not seen the box-feeding system in operation are hereby assured by the writer, who has carefully watched its effects, that it is in every respect consistent with its perfect cleanliness and perfect health of the beasts, and he must, without hesitation, state his belief, that whenever any objection has been raised to the system, it has been induced from having seen boxes of improper construction and fitting, or perhaps from excess of moisture, produced from rain from above, or from springs from beneath. As to the latter observation, respecting excess of moisture, the writer is certain of the fact, that a sufficient quantity of dry litter, supplied three times a week, to keep the animals clean from the solid excrement, is sufficient to completely absorb the whole of the urine they void."

Our Library Table.

Chemistry of the Farm and the Sea. By JAMES R. NICHOLS, M.D. Boston (U.S.): Williams and Co.

SECOND NOTICE.

IN a former number we gave a brief notice of the main features of this work, and, as was courteous to its author, and, we hope, useful to our readers, extracts somewhat brief from the most suggestive of its pages. These pages we stated at the time contained much that was not only practically useful, but very suggestive in some curious points of chemical science as applied to agriculture. Take, for example, what the author says with reference to the analyses of soils. We remember, at the first blush of the dawn of the science, how great were the expectations as to what it was to do for farmers in this department. Analysis of any soil would, it was said, give at once the key to the means of making it all that was desirable, and that as the soil grew the crop, if we only knew all about it, we could get what crops we liked from it; and all this, and much more than this, chemistry was to do for the farmer. So the farmer at least believed, though by no means was it that the chemist himself taught him to believe it. Mr Nichols puts the case very well, as follows. Speaking of the varied nature of some trials of tubers made by him, he states that the analyses of soils constituted a most prominent part of them, and that in this direction he anticipated most important aid from chemistry. However, "it was soon apparent," he says, "that but imperfect guidance was to be afforded by these analyses, however carefully conducted. In fact, the very perfection of the results, the exhaustive nature of the processes, created confusion and doubt, inasmuch as they revealed the presence of elements amply sufficient to meet the wants of plants; and yet they would not flourish in those soils.

"Chemical re-agents make palpable that which vital processes cannot force from their hiding-places. Acids dissolve hard and refractory substances; the tender spongioles of plants can only seize and appropriate those which are already in a state of solution. Hence, chemical research may demonstrate the presence in any given soil of the different forms of food which they require; but if the experimenter authoritatively announces to the farmer that it is fertile and capable of bearing crops, he is in danger of incurring contempt and ridicule, as practical trial disproves his science and his statements. The elements of fertility must not only be present in a soil, but they must exist in an assimilable form. To determine the presence and amount of the useful substances is not enough; research must proceed farther, and declare the *condition* in which they exist. There is very great liability to be misled in analyses of this character, and chemistry has failed to afford much practical aid to husbandmen in this direction.

"I have found that soils holding but very disproportionate quantities of those elements which a particular crop required, would nevertheless produce it in fair abundance. I have to confess to disappointment to false predictions of results in some special instances; and until the true explanation presented itself to my mind, the matter of chemical research in soil analysis was under a cloud.

"What was the explanation? Why, simply this: the soil, although holding the substance sparsely, yet all of it was in an assimilable condition; and as there was enough to meet the wants of a single crop, it was sought out and appropriated.

"If the same crop had been repeated the succeeding year, it would have been very nearly or quite a failure. So long as chemical analyses of soils is inadequate to inform us respecting the condition, or how much of the contained plant food is in a soluble state as required by vegetable organisms, it will be impossible to make any certain predictions regarding its immediate or remote productiveness. Analysis must not on this account be discarded as useless or unprofitable in its teaching, as by its aid a vast number of significant facts have been developed, and many positive principles educed. A soil found to contain none of the constituents which plants require could with safety be pronounced barren; and if there was an utter deficiency of any one essential, like phosphoric acid, lime, or potash, it could with equal safety be declared incompetent to support a certain variety of vegetation. Analysis fails to determine the positive immediate fertility of a soil, as we cannot determine how much material is in an assimilable condition. Viewing the matter as I do, it is not often necessary to resort to this expensive mode of inquiry. As will be shewn, we can fertilize understandingly by chemical aids which do not pertain to the department of analysis. Chemistry not only unfolds the precise nature of soils, but also, as we have seen, the substances and principles which enter into plant structures.

"The relations between the two are such, we are certain, that the inorganic matter found in the latter must have existed in the former. If there were no interfering agencies beyond our guidance, the whole problem of vegetable growth would be apparently the simple one of demand and supply, and this we could control."

From this it will be seen that Mr Nichols takes an enlarged view of chemistry and of the part it plays, or is designed to play, in the economy of the farm. This is further shewn in another part of his work where, after entering into some considerations respecting the cultivation of wheat in the New England States, in which lime and phosphates are deficient in the soil, he remarks—"The inference which seems to follow from these considerations is, that we have only to supply soil deficiencies, sow our wheat, and, casting aside all doubt and anxiety, patiently await the abundant harvest.

"And why should we not do this? Have we not solved all necessary problems? Have we not learned by analyses what food is wanted, and have we not furnished it? Have we not learned precisely the constitution of the vegetable structure and its seeds? Do we not understand the nature of its appetite, and how it must be fed? Certainly we do. Why, then, should we meet with failures? Because we cannot bring under control all the conditions of vegetable growth. We could better command success were there no uncontrollable influences to be taken into account. The chemist cannot order meteorological agencies. He finds in his examination of plants, that they contain an abundance of water, and he also learns that vast quantities are constantly being exhaled during growth; and still another most important fact stands out for recognition, the food he supplies must be soluble in water, and, by its agency, voyaged through the microscopic canals to its appropriate resting-place. Water, then, is needful for perfect development of plants and seeds. Heat must also be supplied. The clouds must let drop the rain, and solar rays supply the diffusive warmth, else the husbandman returns from his harvests in sorrow, and science fails to aid him. Let us not unjustly condemn its teachings because it is unable to control the caprices of the seasons.

"It is seldom, however, that crops utterly fail from the withholding of heat and moisture. Our fields are lean because of starvation—because we do not supply, through the soil, the food which plants require.

"Chemistry teaches, what had already been learned from observation and experience, that in feeding vegetable growths, the kind of aliment demanded differs in different organisms. There are certain great families of plants which have diversified appetites, and they must be gratified in their tastes, or they refuse to bring forth their like. We know what they require, and we obtain hints as regards the best method of supplyng their wants.

A chapter is devoted to the Chemistry of the Sea, n which some interesting matter is given, but we pass on to notice the chapter on the "Chemistry of the Dwelling." In this some capital hints are given on he subject of warming, and that domestic nuisance, a smoky chimney, which ranks first in the brief list of man's worries, the second of which gallantry forbids us here to name. On this nuisance, which probably causes in great measure the other domestic nuisance to which we have alluded, and only alluded, the author has the following useful observations:—

"A few simple principles are worth rememb respecting the *cause* of draught and methods o creasing it. If a chimney is constructed of height and dimensions, it is of course filled with And if the column of air within it weighs as muc a column of equal height surrounding it witho will have no draught. Two things operate to ch the relation of the columns, and create an ascensi current within the chimney. One is elevatio height; the other, warming the air by fire, by w it becomes rarefied, and its weight diminished. taller the chimney, or the hotter the fire, the rapid will be the draught. It must be constru vertically, as much length horizontally, by coolin air before it gets into the effective part of the flue, be sure to spoil the draught.

"If a grate or fireplace is troublesome by reaso incompetency to convey away smoke, it may be o to too great an aperture above the fire, so that a volume of cold air enters the flue without pa through it, and thus is constantly cooled. A connecting with it would work satisfactorily, bec the air would be compelled to pass through the and thus keep the chimney current warm and ac A sliding valve, so arranged as to increas diminish this orifice *above* the fire, is often a com remedy.

"Chimneys upon the north part of a building d uniformly work as well as others, because of th frigerating influences of the locality. A chimney situated may be made successful by constructi double, or making an air chamber around it to serve warmth. Blocks of buildings are much from smoke anoyances, because of the multiplic flues, which diffuse a constant warmth throug walls in which they are constructed.

"There must be a sufficient supply of air fl into the parlour to maintain vigorous combu else there will be defective draught.

"One great source of smoky chimneys in cit country is the contiguity of high buildings or hi which their tops are commanded. The smoke i cases is beaten down by the rush of wind over like water over a fall. In such instances, one o things must be done—the flue must be raised than the eminence, or resort must be had to body's patent cowl or revolving bonnet, a contri in such general use in cities that the lines of viewed from an elevated point, look like regime grim warriors, with their heads dressed in ugl tastic gear, nodding and twirling in the wind."

There is a chapter upon the "Chemistry of a B Milk," another upon a "Kernel of Corn," a upon "Obscure Diseases," a fourth upon "D position in Lead Pipes," and a fifth upo "Chemistry of the Sun." Leaving the reader, c to know what can be said upon this exalted su to the purchase of the book, we come down to the or at least more lowly, yet not useless, subj

aking. Much information is given on this
in its pages.

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w of Salmon Fisheries. By THOMAS BAKER,
q., of the Inner Temple, Barrister-at-Law.
ndon : Horace Cox, *Law Times* Office.

UGH the surroundings of the present season
themselves much more with the denizens of
m-yard than with those of the river—more with
than with trout, with goose than grayling, and
ple sauce than with salmon, still it is not bad
s reading that brings to mind the pursuits of
time and of summer—that prepares us to carry
out, and informs us on all points concerning
And now that salmon is so especially under
re of the law, and that rivers are so hedged
or staked in—a much more appropriate simile
way—with all the defences of legislative enact-
bristling, so to say, with the points of the law;
ssential that those who follow the sport of
fishing should know what they are now
d by law to do, and what the same stern
says they must *not* do. This knowledge will
ived from the work under notice, and, although
ted with what is anything but a dry subject, we
confess that it must be said of it that it looks, at
nts, very like dry reading; for legislative enact-
with their "whereases," and their "be it pro-
," and it "is hereby enacteds," can scarcely come
the category of pleasant reading. Still, as these
ents, in the present case, contain a good many re-
s to the peculiarities of the sport, the work before
convey some information, and afford some suggestions not entirely of a legal character. Moreover, as the old woman is said to have derived much consolation and comfort from the mere repetition of the word *Mesopotamia*, we may conceive of it as a not unlikely thing, that some of our readers may find in the pages of this work, which gives the enactments, matter for "righte, goode, pleasante" reading, and in the anticipation of the "pains and penalties" therewith connected, as they affect "poachers on other men's preserves," may get all the benefit, if benefit there be, of what is now called "sensational reading." And a reader not quite up to the minutiae of salmon-fishing and its adjuncts may find, even in the table of contents, one element of sensational reading—mystery; and if he there meets with the words "craivies" and "cribs," "portes" and "patchers," surely he has only to turn up the pages of the work itself, and he will know all about them.

To those who do not care to *wade* through the depths of the enactments themselves, the author has provided a very lucid summary of them, and in a series of carefully prepared notes interspersed throughout the text, has done much to elucidate what may be obscure or ambiguous in the acts themselves. A distinction is also drawn between the Acts or parts of the Acts, applicable to Scotland, as differing from those relating to England. Altogether, within the small compass of a pocket volume, the author has contrived to compress a vast amount of matter, which, if not, in the popular sense of the term, readable, may be read, and with profit, too, by those interested, so that it cannot be said of the work, what Charles Matthews says in "Used up," of Vesuvius, "there's nothing in it."

The Garden.

THE SUBURBAN AND AMATEUR'S GARDEN.

IT is notoriously true that, after all that has been said and written upon gardening, very much more information is essential, and that of an elementary kind. Writers upon horticulture essay to distribute knowledge more among their own coteries than among that class which represents by far the largest number that verily thirst for information, of the highest importance to them in their hours of pastime in the garden. Notwithstanding all the periodical literature devoted to garden pursuits—and no one can object to its quality and aim, so far as it goes—how often are questions raised by the purely city men upon certain operations in connexion with flower, fruit, or kitchen gardening, which even practised writers deem too simple or unimportant to notice. We have had ample opportunities of hearing of the extent and variety of the wants expressed; and acting more upon general than personal consideration, we have resolved, as concisely as possible, to go over the neglected ground, to detail the *rationale* of the simpler branches of gardening, in order that a greater number be enlisted into the fold, and kept there, enraptured by an unqualified success; to prepare, in fact, a manual for amateur gardeners, which is admittedly a great want at the present day. This we purpose to continue weekly until completed.

Need we touch upon the healthful influences that are the sure concomitants of periodical operations in the garden; and then, what an amount of innate pleasure is engendered at watching the development and progress of flower, or vegetable, or fruit, all the more enhanced and prized in the estimation certainly, [illegible] some little frivolous attention, that might have otherwise been spent in vain, has contributed to the beauty or perfection of the h[illegible] under admiration. But our mission is not to moralize; it is to give some practical instructions, and we proceed therefore at once to treat first upon

CHAPTER I.

THE SOIL.

If we were to write an essay upon the soil, debate upon its various constituent particles, tell how much should be organic and how much inorganic, and use quantities of technical terms to distinguish the one from the other, it might look very learned, but it would fail to be instructive to the great mass of amateurs. It would, indeed, perplex more than instruct the constituents, whose suffrages and support we are interested in soliciting, and, therefore, we must venture upon some other line of tactics. Simplicity is to be the order of the day in all our teachings, and instead of asking our readers to go to a chemist's laboratory to study and arrange their soil to a proper formula, after they have matriculated, we would ask them in a general way to read this chapter, we venture to predict they will not rise up unrewarded.

There are two opposite kinds of soil in common phraseology—the one a stiff, and the other a free soil. The one is very plastic and very retentive of moisture; the other has particles which are more disuniting, and consequently more amenable to atmospheric influences, and moisture passes more rapidly through it to the subsoil and the drainage beneath. Both of these soils, even in the maiden state, have their advantages; the former, in a favourable mild climate, where rainfall is only moderate, is preferable; the latter, looking to the seasons which generally fall to our lot, moisture and coldness, as a rule, prevailing, is that which must have a general recommendation. The very best kind of tilth, however, is a judicious combi of both; the one having strengthening es for infusing vigour into the plant, e other, from its texture, upholding the ter of the mechanical or physical state soil. These are germane points for ody's consideration; and we shall select or two for illustration, adducing, at the time, certain corrective ingredients to up a better whole.

ne suburban and country sites have stiff clayey soils. The gentleman ing or owning the cottage or villa gives heed about these things, only engaging, the whole building operations have finished, that the ground is to be dug and that a certain portion is to be re- d for vegetable culture, the front for rs, &c. The best face is put upon s possible, the house is tenanted, the g comes round, vegetable and flower have been carefully deposited in the d, and a proportionable harvest is d for and expected. July, August, and mber pass the cycle of time, and blank y is manifested at such barren results, possibly, with a certain disgust, the r plots and borders are taken leave of own down with grass, as being the most ctive and least barren-looking base to untry villa or cottage. The picture is in the least overdrawn; many people be ready enough to endorse it as reality. How much really would the r or occupier have given to have been d the painful necessity of looking on, on going and coming from business, wouldn't he have gladly eked out a of his savings if he had known how to nt such a muddle?

e same remarks, although not to so an extent, may, in some measure, be ted to poor lean soils, so free that, what evaporation and drainage, the plants, in nd of dry weather, are nearly starved of existence; and if a proper regard t shewn for them at the proper time, a rsal leanness will prevail, and dissatis- n, creating ill-humour and eventually e, will be the upshot, and gardening and ning taste may be immured in the breasts of these suppositious parties for ever.

But there is fortunately always a right and a wrong way of doing things, and our intention is shew the better way.

Firstly, and mainly, no position or no site ought to be selected where there is not a proper depth of soil for gardenesque purposes. Without a due balancing of the gardenesque with the architectural, there is neither beauty nor comfort, because the most important features of a country residence are not to be in subservience the one with the other. The selection of a bald site, where superficial stratum is only a few inches thick, and then comes rock or whin-stone, is even worse than a quagmire, which is capable of being, to a certain extent, corrected for purposes of utility. But fortunately there are few such spots to be found in any of our agricultural districts, and the more reason, therefore, for insisting that proper treatment should be observed at the outset. All garden soils, after they are apportioned out, should be trenched to the depth of 18 inches, and the best soil should always be kept upon the surface. To turn up inferior soil and bury superior, is like burying gold without putting it into a proper remunerative channel. It is all very well for great gardens, that have been so some for a quarter, and some for half a century, to turn and re-turn where the staple is all first-rate, but it won't do for young gardening. It is to be premised always that drainage has been provided in the estimate, for without a wholesale passage for waste water the best schemes of the operator will fail. Then, if the soil be very stiff, collect all the lime rubbish, all the freestone, as much of coal ashes, and, in fact, anything that has a tendency to disunite—even small stones themselves—and incorporate these with the plastic soil. Bury your small stones, and don't gather them to be thrown in the rubbish heap, for each in the soil is acting a part to keep the whole disunited, so that the desintegrating influence of æration may take place. Such a soil, as a rule, must not be lavishly supplied with manure from the byre; it must the rather be selected from the stable

Choose fermenting manures for heavy land; the opposite for light land. The most important consideration decidedly for heavy clayey soils, after deep digging, is the introduction of such ingredients as shall best uphold and maintain its physical system. Let this be done, and artificial feeding with guano and phosphates will have a powerful effect upon the growing plants; leave it undone, and æration cannot act; the roots become water-logged, surfeiture is the sequence, and the rest of the ills that ensue may be left for the imagination to picture.

There is far more difficulty in correcting light soils, and, in fact, in getting people to correct them, with the material placed at their disposal. Light, friable loams are excellent soils for germination, for development up to a certain stage; but they want bottom, or "staying powers," in racing phraseology, to carry the different individuals to the goal towards which their youth and beauty indicated. The byre manure may be resorted to here along with the deep digging process to much purpose, and even barrow-loads of clay itself are powerful for good. The plastic tendency of unfermenting manures and of clay itself, gives stability to the staple, and it should never be lost sight of when come-at-able. Such is a brief outline of what is desirable to prepare for in foundation work.

With all this, however, there is another series of ills that stares the tyro in the face—the plague of insects. Curiously enough, high health is the best antidote for keeping away the winged pests, such as aphis; but it is not proof against the inroad of slugs and snails. These pests must be specially provided against. Colonies of them lurk about covers, such as lines of box, grass plats, and such ike, and make a raid early in the morning, ate at night, and in wet weather, at the expense of the choicest of flower seedlings. It s very provoking to all and sundry, and their ravages, by the uninitiated, are often set down to the feeble germinating power of the seed supplied by the seedsman, when really that has had nothing whatever to do with it. It requires a keen and observant eye to notice all these things, and a mind fertile in resources to deal unscrupulously with them. Those gentlemen who have tenacious soils should manure the ground in spring with hot lime, which kills everything in the slimy way with which it comes in contact, and is powerful otherwise for good. Besides this, a few shells in a dry corner are valuable for preparation at any given time when injury is apparent. Hand-picking is a slow and, at best, an inelegant process; lime is the antidote, and a few shillings will provide the wherewith.

The main points may be recapitulated to draw the special attention of the tyro. First, a proper and convenient site for garden as well as house; next, some definite decision as to how the ground is to be laid out, and action taken accordingly; next, drainage; then, formation into divisions or plots, and the proper making of walks; then, deep digging, and incorporation of foreign material with the natural soil; and then, the landmarks of grass or box, or both, as it may be. This brings us now to that portion of the kalendar of operations when seed is deposited in the spring, and in our next chapter we shall tender our advice upon vegetable seeds.

CHAPTER II.

KITCHEN GARDEN SEEDS.

These seeds may, to facilitate description, be divided into two sections—vegetables having large seeds, and vegetables having small seeds.

The first section embraces peas and beans, including the broad bean, and the smaller and more delicious kidney bean, which is rapidly finding its way into general use. Talking of the latter bean, and of the scarlet runner, which is both useful and ornamental, there is no greater acquisition in the cuisine department. True, it is of short duration as a kitchen article, owing to its tenderness, but if sown in the beginning and during the latter end of May, it will furnish dishes from the latter end of July till frost summarily disposes of it. Every English cottager thoroughly appreciates this article, and so will every Scotch cottager, when he has fairly tried it. We know of no plant of easier culture than the scarlet runner, a species of the same genus as the kidney bean, and equally as palatable. To shew how easily this is managed, we have actually partaken of several dishes grown in the back-yard of one of the crowded streets of London, and most excellent did mine hostess serve the dish to a joint of roast beef. It requires the assistance of stakes like peas, growing, as it does, from 4 to 7 feet high, according to cultivation. Peas are too well known, and too much appreciated, to require any laudatory remark. One thing is certain, that the pea is a deep-rooting plant, and that in proportion as the grower is kind to it, in providing room and pabulum for its roots, so will the produce be. The same may also be said of its haulms. If rows are sown too closely together, a considerable per-centage may be deducted off the yield, if estimated in opposition to single rows sown widely apart.

In sowing any of these large seeds, there must be drills prepared, about from 2 to 4 inches deep. In these drills, sow the peas tolerably thick, the broad beans about 4 inches apart, the kidney beans about 1 inch, and the scarlet runners tolerably thick, to cover the stakes or the netting which some people make use of, and to good purpose. An old herring-net, stretched in double file to posts, answers first-rate, and so does wire-netting, where it can be had. Both these latter things, in any garden, are much more appropriate than a lot of ugly stakes. Choose, if possible, a dry day, when the soil is somewhat dry and springy, or elastic to the feet. Cover with a rake, leaving the soil over the drill of a convex form, name and date the sowing, and it will be a guide for future reference. As to the kinds and period, we append the remark that one or two good sorts are, if sown in succession, worth a whole batch of indifferent and unprolific ones.

The best *peas* at present in cultivation, as proved and recommended by the largest growers, and particularly by Mr Barron, superintendent of the Royal Horticultural Society's Gardens at Chiswick, are, keeping to order of maturity in point of an early and late season, Dickson's First and Best; M'Lean's Advancer, a fine green marrow, and very prolific; M'Lean's Princess Royal, a large white variety, and abundant in yield; M'Lean's Rising Sun, or Prizetaker, a little later; M'Lean's Ne Plus Ultra, or Payne's Conqueror, one of the very best late peas in cultivation; Premier, a new and excellent wrinkled marrow, considered a great addition for summer and autumn. As to periods of sowing, the first two may be sown on the same day, and they will come in in proper succession. As to date, each party must be guided according to the district, whether it be a favourable or an unfavourable one for early crops. The great body of amateurs had better delay first sowings until late in January or early in February, as, by doing so, the yield will be all the more satisfactory. Unlike the great gardens of the country, their space is limited, and it is economy to study how it can be best and most profitably occupied. A week or two in advance for a stated dish of peas is only the object of those gardeners who have to cater for variety, and who have ample space and means at their disposal for carrying out the plan. The other four named sorts may be sown at intervals of a fortnight, and by that means a steady useful supply can be furnished. As to the quantity required, that must be regulated upon the basis of an estimated demand. Half a dozen pounds of peas is no great matter for any villa resident to purchase; and if his garden soil be in proper order, the supply will more than compensate for first cost and labour combined. If any villa occupant desires a dwarf pea that can be sown alongside of walls, or even in a row by itself, by all means get M'Lean's Little Gem. It does not grow above a foot high, and it is a wonderful cropper, yielding pods from almost the bottom eye of the haulm.

The best *broad beans* of large size are Mazagan and Monarch Long Pod. If a neat dwarf grower and small but abundant podder was wanted, get Beck's Dwarf Green Gem; it does not grow above a foot high. The best kidney, or commonly called French, beans, are the Early Dun-coloured and Perkin's New Early Warwick, which is held in estimation as a most desirable novelty for general planting, being both early and productive.

The second section, comprising vegetables having small seeds, embraces a wide field of individuals selected for culinary purposes. These may be subdivided into classes, comprising, first, those seeds that are sown with a view to remain stationary until lifted and served, or preserved for the kitchen; and those that are sown, and require to be transplanted into some prepared quarter to arrive at anything like perfection of growth.

Among the first-named we have onions, leeks, carrots, parsnips, beet, turnips, and spinach. There are other things which an epicure might demand, and which all our great gardeners have to cater for; but enough is enumerated above for an ordinary ambitious palate, and for all that the readers of our little Manual care for.

The first four named are generally sown on the same day, the fifth and sixth a little later, owing to both of them having a tendency, if too early sown, and too early germinated, to run prematurely to seed by means of the influence of frost; and the last is generally as early sown as weather permits, in order that there may be a gathering or two before early cabbages come into use.

Onions and *carrots* are two special favourites, and, both requiring the same kind of treatment, we shall advert to them first. Both should be sown as early as the season permits. Each must be guided in their own locality as to that point, but upon no account sow or tread upon the ground, or even dig it, far less portion it out into beds, during wet weather. Promptitude, and some knowledge of barometrical readings and tendencies, are valuable helps to any in preparing to sow. As a rule, these two vegetables should be sown in beds, as long as you like, and from 3 to 4 feet wide accordingly. Let the ground, which we shall suppose has been trenched for a month previously, be turned over with the spade and pulverized as much as possible. Next, mark off as much as will be necessary with a rod, leaving from 15 to 18 inches for alleys. After the beds and alleys have been marked with pins, stretch the line, and tread off the alleys with the feet. Proceed then to sow, which may be done both expeditiously, evenly, and well, by shaking the seed out of the bag after the style and motion of a labourer riddling gravel. Afterwards take a spade and remove a little of the alleys first to the one side, then to the other; adjust the surface of the bed afterwards with a rake, then form the edges of the bed with the back of a spade, lay the line alongside of the boundaries, and cut a margin as straight as you can, and the operation is complete. Leek seed may, for general purposes, be sown similar to the plan noted above.

All small seeds should be deposited tolerably thick; for inclement weather, the devastation of slugs, and the feeble germinating power of certain seeds demand some forethought, and a little extra provision to be made. There is only one exception in the whole of the vegetable seeds enumerated, and that is carrot seed. As a rule, carrots are a precarious crop, never doing well after the seedlings are thinned. The maggot and the fly are two prevailing enemies, and if they are at work conjunctly, farewell to a crop of carrots. It is not easily explained, but it is, nevertheless, true, that if the plants remain untouched in pretty hard ground, they are far more likely to escape the ravages of these insects, whether the seeds be sown in beds or in rows. The advantage of sowing them in rows is, that the plants are easier kept clean, and that æration is less impeded this way than when the plants come up broad-cast in beds. We strongly recommend those who have failed in certain districts with this crop, to attend to the following precise instructions—Dig the ground deeply, keep the best soil to the surface, manure the lower tier of ground turned over, sow thinly, either in beds or rows, sprinkle a little onion seed among the carrot seed, and never pull a seedling by way of thinning, unless for pot use. Upon the common rule of the stronger overcoming the weaker, the onions will be discomfited, and the carrot crop triumph.

Parsnips and *spinach* may be sown in drills, the former 2 feet between row and row, and the latter 1 foot. The drills will require to be from 2 to 3 inches deep, and the sowings, in either case, may be thick. Spinach is a useful vegetable, and can be had, if there has been an autumn sowing of the prickly variety, the latter part of late winter and early spring. The spring sowing is that which is more generally attended to, and which is recommended to every owner of a garden, large or small, because it fills up the gaps between Brussels sprouts and broccoli on the one hand, and cabbage and cauliflower on the other. It requires little attention, and can be thinned out in the rows for a dish, so soon as the leaves are the size of sorrel.

Beet, when full grown, makes an excellent pickle, and can be called to the aid of the vegetable department at any season. It is best sown in drills like spinach, about from 18 to 24 inches apart, according to the habits of the respective kinds. Never sow it till the middle of April; for if frost touches the embryo seedlings, many of them will run to seed, and the roots afterwards are, on that account, stringy and worthless.

Early sowing is also detrimental to *turnips*, acting precisely the same way upon the plants. There is one variety, however, that is better proof than its neighbours against running to seed, however early sown, and that is the early white Dutch. This may be sown, from February to April, for succession, with the best results. The other sorts take a much higher position after that time, and monthly sowings provide splendid sorts for table use. It is a very great matter selection of seeds at all times, and more particularly with a plant of this kind of so immense importance, not only as a culinary requisite, but for the fattening of stock. Looking to its position as a table article, we have often been surprised as to the great disparity of judgment there is between our great epicures south of the Tweed and those on the north. A yellow turnip, however excellent and delicious, is scarcely tolerated upon the table of an Englishman, and we are at a loss to know the reason why. It must be because of a certain prejudice to the colour; it certainly cannot be ascribed to flavour. The pure strain of golden ball turnip may be fearlessly placed alongside of the best white flesh turnip in cultivation; and we recommend strongly all those of opposite opinion to test them both fairly, resting assured that our verdict will be confirmed. Light drills of less than 1 inch depth are sufficent for receiving the seeds, the power of vitality being great. For early sowing the seed had better be committed rather thickly to beds, and as small bulbs are very sweet and palatable early in the season, thinning need not be resorted to until the bulbs, more properly speaking roots, are fit for use. Fresh seeds, or seeds recently gathered from the harvest fields, should always be insisted upon, as their powers of vitality are at a much greater ratio than seeds of two and three years' standing.

The best *onions* for the class we are now advising are, first, Danver's Yellow; next, Strasburg; and next, Blood Red. A little packet of each of these would give a nice variety. The Strasburg is much the hardiest and the best keeper of all the onions; while in the Danver's, there is model formation, good size, and it is altogether a very palatable onion.

Nothing in *leeks* is better adapted for general use than the old Musselburgh. All the other sorts are only selected plants to reproduce larger strains. The Ayton Castle and Henry's Hybrid, produced in such mammoth proportions at all the shows north of the Tweed, have originated from the Musselburgh. If there be any distinction in kinds, it is impersonated in the Large Rouen, of continental sources.

Carrots are well represented in the Short Horn for an early supply, and Altringham for general work. Where the latter fails, get the New Intermediate, which is said to do better than its compeers in a shallow soil.

Parsnip growers may look upon the true Hollow-crowned as one of the best and safest for general use. The Student is a larger and fully a finer variety, but the former is a capital strain.

Spinach, as represented by the Prickly for winter, and by the Round for summer sowings, has no better representatives generally.

The Flanders is highly spoken of and recommended by Mr Barron as a hardy broad-leaved variety.

The two finest strains in *Beet* are Nutting's Selected, a dwarf red of excellent quality, and *the* beet for the million to grow. Pine Apple Short Top is considered of finer quality, but it is neither so large nor generally so constant from seed as the first named.

Turnip seed is quite a trade by itself, and the kinds we would here recommend for general culture in both small and large gardens are, first and foremost, for early work, the Early White Dutch, and thereafter Golden Ball for general crop. If another be wanted, get Red Top American Stone, which is a great favourite in England.—*A.*

[To be continued.]

GARDENING PROGRESS DURING 1868.

IT is always a cheerful task to revert to the successes of the past. Whatever shortcomings there may have been—and we have never been slow in promulgating them—there is much to cheer the enthusiastic and advanced horticulturist. Steps are being slowly taken to rouse a provoking apathy to self-improvement, to instil a disposition to mental activity, whereby those directly interested can with some shew of reason, exhibit the proper spirit of self-independence. The first and greatest stride towards the achievement of this is in the projected Horticultural Congress. The most influential and independent portion of the horticultural press has "cried aloud" in the matter, and the Council of the Royal Horticultural Society has given effect to the appeal, by an announcement, a week or two ago, that they had determined to set the scheme afloat at Manchester next July, under the management of a small select committee, Mr Moore acting as secretary. This is as it ought to be, and we wish it a success co-ordinate with its importance to the advancement of gardeners. Stimulated, as no doubt the promoters of the Royal have been, with the unqualified success of their several undertakings in respect of the practical and theoretical class-teaching at Chiswick, of the migratory exhibitions in connexion with the Royal Agricultural, of their first and greatest plan of fortnightly exhibitions and discussions, and of the Scientific Committee [illegible] there is every inducement for a Council pioneering and carrying to a successful issue a Horticultural Congress. We have yet to complain of the get-up of this Scientific Committee. While it embraces a class of men upon whom no finger of hostile criticism could be pointed, it excludes, rightly or wrongly, the few—let it be called the very few—whose matured experience, upon the most difficult practical questions of the day, possess infinite importance; and who, instead of tarnishing or diminishing the influence of that select body, would throw additional lustre upon their proceedings. It is upon the great principle of the division of labour that our arts and manufactures have attained such a wondrous development; and it can only be by numerous and diverse atoms of knowledge, exchanged and segregated that this committee can hope to discharge aright its important and self-imposed duty.

Novelties, during the year, have been as numerous as heretofore, some of them good, others, and by far the greater number, only interesting from a botanical point of view. To the great body of the public high class plants, or plants remarkable for beauty in some feature, whether in the matter of flowers or foliage, are such as must ever be reckoned of paramount importance in any review, or *resumé*, of the notabilities of the year. There must also be specific distinction to entitle individuals to notice, certain classes excepted, else it would be a most elaborate wade through all the florist's domain, and that would be no sinecure. As usual, the great trying test has been the corporate floral and pomological committees, that meet fortnightly, under the auspices of the Royal, for nine months in the year, and monthly the remaining three months. These men have discharged an onerous duty at all times satisfactorily, and they merit, and are awarded, our best thanks.

Prominent among flowering stove plants is Lasiandra macrantha. It is not only the finest of its year, but it is the greatest acquisition that melastomads can yet count upon. Its deep violet-purple flowers, nearly twice the size of Pleroma Benthamiana, are of extraordinary substance, and they grow upon the crowns of dwarf-habited plants, and, in this respect, so immensely superior to Bentham's wayward Pleroma as to stamp the species with an uncommon die. It was introduced by M. Linden from St Catharine's, Brazil, and plates of it have respectively appeared in the "Botanical Magazine," and in the "Florist and Pomologist." Mr Bull's Allamanda nobilis is one of the best of that showy flowering tribe of plants which is so much run upon by exhibitors, the limbs of the flower being of superior texture, and the form such as a florist would desire; it is also sweet-scented. Another plant, requiring stove heat, merits recognition. It is Dipladenia amœna, a garden hybrid between D. amabilis, and D. splendens, raised by Mr Wm. Dean, Bradford. All the Dipladenias are among the most beautiful of dwarf climbers, and are trained so as to form specimens of shrub-like order. Mr Dean has been fortunate in securing a hybrid fully in advance of its parents, yielding rose-coloured flowers, each having a prominent yellow throat.

In plants remarkable for fine foliage there has been, as usual, a diversified and a a numerous set, either staged or advertised for public approval. None merit noticing more than the batch of plants sent home from the South Sea Islands, by Mr John G. Veitch. Similar infoliage to the Crotons that have for years been cultivated, they retained temporarily the generic name. Dr Masters, however, has properly referred the whole of them to the Codiæum branch of Crotoneæ, and there are several excellent forms of them, both as regards the dissimilarity of the formation of leaves, as well as the diversity of green, yellow, and red colouring with which they are blended. The best of them are C. variegatum interruptum, C. var. irregulare, and C. var. Veitchii. All these are not only suitable for stove conservatory decoration, but they will ultimately assume importance as drawing-room and dining-table decoration plants. Some nice additions to palms have been brought to notice in Van Houtte's establishment. The more important of them are Veitchia Johannis, having nice arched fronds, on a silvery white spadix; Oncosperma Von Houtteanum, something after the same character, with pinnate fronds, leaves finely serrated, and the spadix tinted with a reddish hue. Geonoma imperalis, from South America, and G. Seemanni from Central America, exhibited by Mr Bull, are very desirable acquisitions to the tribe, and give promise of being generally useful from their apparently dwarf character.

Orchids in the past year have been unusually numerous, many of them of great beauty, giving an additional incentive to the possession and cultivation of this fascinating tribe of plants. The two plants of the year, that may be considered as taking place head and shoulders above their fellows, are Oncidium macranthum, and Lælia anceps Dawsoni. The former flowered in the choice collection of Lord Londesborough at Grimston, the latter in that of that enterprising amateur, Mr Dawson of Meadow Bank, to whom the variety was dedicated. The Oncidium yields long flower racemes, and the flowers when expanded take so many as five half-crowns to cover their sepaline and petaline segments. When in the hands of cultivators, who understand and appreciate its cultivation, its beauty will not be easily eclipsed. It is one of the Peruvian importations, and was discovered in common by the collectors of Messrs Backhouse, York, and M. Linden, Brussels. The Laelia, which was described and named in our columns, is from Juquilla in Mexico, and although far from the home of its congener and type, L. anceps, it is not specifically distinct from that choice orchid. The distinction is entirely in colour, the normal form being a variety of shades of purple, that of var. Dawsoni pure white. In that respect it takes rank with the choicest of moth orchids (Phalænopsis), and coming into flower, as it does, during the festive season, its attractions are enhanced. Two other plants have been dedicated in honour of Mr Dawson, the one Anœctochilus Dawsonianus, the other Cleisostoma Dawsonianum. The former was sent home to the Messrs Low of Clapton, from the Malayan Archipelago, and named from the beauty of its foliage, as it has not yet flowered in this country. It promises to be one of the best growers of a race, proved to to be exceedingly difficult both to cultivate and perpetuate, and, when produced in character, will yield the palm to none of the family name. The Cleisostoma is a Moulmein plant, introduced also by the Messrs Low, and first flowered in the Meadow Bank collection. It is an acquisition to an otherwise dull, and by no means captivating genus. The rare Aerides mitratum has been flowered in the collection of Mr Day of Tottenham. Cattleya speciosissima Lowi, named and described in our columns, may challenge comparison with any of the labiate family. Its gorgeous flowers and the intensity of colouring characterize it as a variety, worthily dedicated to that enterprizing nurseryman, Mr Stuart Low. Cœlogynes have had a welcome addition, recently flowered in the Veitchian collection, and appropiately dedicated to the greatest living authority in orchid nomenclature—Professor Reichenbach [illegible] Hamburgh [illegible] partakes, looking [illegible] character [illegible] flowers, [illegible] rosy [illegible] white emar- [illegible] deep purplish [illegible] most beautiful; [illegible] genus of the di- [illegible] family proper. The addition of D. crystallinum, as a foundling, too, coming as it did in a mass of D. Pierardi, is a most welcome one. The flowers are produced in pairs, down the dried or ripened pseudo bulbs, and as many as 30 are producible in one shoot. Individually they are large, white, largely tipped with a warm shade of crimson, the labellum having a prominent ochre blotch at its base. It was first exhibited by the Messrs Veitch, and has flowered since on one or more of the private collections of the country. Among Epidendrums we have had E. Ghiesbreghtianum, from the Dayan collection, and E. ibaguense from the Messrs Backhouse. Both are good plants, the latter valuable, owing to its dwarfness of stature, especially as one of the distichous group, and the decorative character of its umbelliferous-like head of flowers. It is one of the Peruvian introductions. E. paniculatum, introduced from New Grenada, by the Messrs Veitch, is one of the taller growing species, but bears conspicuous terminal panicles of rosy lilac flowers, allied and akin to E. Cooperianum of Bateman. We have had no less than a mule orchid, first flowered by Mr Edward Salt, of Ferniehurst, and named Miltonia festiva. It is clearly one of these wild hybrids, brought about by insect agency, a process so elaborately and beautifully defined by Darwin in his little book on the "Fertilization of Orchids." It bears upon its character the spike or raceme of Cyrtochilum flavescens and the more showy flowers of Miltonia spectabilis. Masdevallia Veitchiana is a bright flowering example of a very captivating genus. Nothing half so curious has, for a long time, appeared as the infloresence of Nanodes Medusæ. Its mode of growth, and its thick, short, fleshy, distichous leaves, invest it with a decided character; but to that we have to add flowers having somewhat inconspicuous olive-green sepals and petals, but a most imposing orbicullar labellum, of a dull yet pleasing purple hue, and deep fringes of the same colour, like a piece of fancy work. It has only flowered in the Dayan collection, but there are not a few plants of it in the country. Then we have had the rare Odontoglossum Andersonianum, dedicated by Professor Reichenbach to Mr Anderson, the gardener at Meadow Bank. It is also a mule, partaking somewhat of the combined characters of O. gloriosum and O. Alexandræ. O. Krameri is one of the freest flowering of the favoured race of Odontoglots, and found its way into commerce through the Messrs Veitch, the latter parties having obtained it from M. Kramer, in Costa Rica, in whose honour it was afterwards named. Oncidium Marshallianum, first and only flowered by Mr Marshall at Enfield, is a pure yellow O. crispum, which was imported by the Messrs Low, and a most desirable plant it is. It created quite a *furore* at the Royal Horticultural when exhibited. The charming tiny growing O. Limminghei has an unusual claim upon us, having flowers quite as large, in proportion to the pseudo bulbs, as Sophronites grandiflora, and very fine flowers they are, with a golden ground colour, blotched and barred with chocolate. It is one of the Messrs Lows' Brazilian introductions, and is now largely in commerce. The two last plants that we are about to name, in the orchid way, are Thunia Bensonæ, and the true Vanda insignis. Both these originated through the Messrs Veitch, and both are first-rate plants. The Thunia is so like, in habit of growth, Phajus albus, that it would be impossible to separate them. The flowers, however, of the species in question, far eclipse the species with which it is compared; the sepals and petals are bright purple; labellum of same colour, with a lighter shading towards base, and prominent yellow calli adorn it. Flowers of the V. insignis have been submitted to us by the Messrs Veitch, and there can be no doubt that, up to date of flowering, the V. insignis of Blume has been quite unknown in this country. In truth, the so-called V. suavis, tricolor, and insignis, as we were accustomed to know them, are simply varieties one of another, taking rank, as decorative varietes, in the order they are named. The true V. insignis, we are happy to say, is reproduced, and the plant which Dr Lindley never saw is now in commerce. The tiniest morsel brings five and twenty guineas, so that readers can guess the very important place it is taking in the estimation of orchidophilists.

Among miscellaneous plants, comprising greenhouse, hardy, and border plants, there are some that are noteworthy that we must pass over, looking to the space already taken up. The hybrid azaleas, A hybrida odorata, and A. mollis glabrior, taken from Japan, and flowered in the St Petersburg Botanical Garden, are worthy of an extended cultivation, coming in, as both of them will do, so well for early forcing. Mr Bull's Gladeolus cruentus is likely to be a promising parent, of a greatly diversified batch, of an altogether prepossessing family. The bright red colour, and the white zonation peculiar to this half-hardy Iris-like perennial, are captivating in the extreme. Another bulb of undoubted attraction is the Lilium Thunbergianum pardinum, a more gigantic sample of the species, with fine deep orange flowers, dotted conspicuously with deep crimson. It was flowered and exhibited by Mr G. Wilson. An acquisition to herbaceous pæonias has been flowered in the Glasnevin Botanic Gardens, having large single white flowers, several flowering together on the same stem. It was found in the Himalays, and is called P. Emodi. We find in the *Revue Horticole* a rose of hybrid origin, pure in that respect, as a reproduction from the infused blood of Rosa and Rubus. It is a climber, vigorous, and produces thyrsoid heads of pure white scented flowers. Then, again, we have from the Quitonian Andes an interesting passion flower, named Tacsonia eriantha. The flowers are of a roseate hue, springing from a woolly calyx, and are said to be twice the size of T. mollissima. It is one of Mr I. Anderson-Henry's importations. We must not omit to mention the flowering of Dahlia imperialis, which Mr Bateman brought prominently under notice at one of the fortnightly meetings in 1867, having seen it growing and flowering in the neighbonrhood of Pau. It attains quite a score of feet high, and yields flowers towards that elevation. It may be of some value as an individual for hybridization, but its figure is too tall and gaunt, and the produce, in the way of flowers, too meagre to invest it with a particular importance.

Among hardy shrubs there is a great gain in Spiræa palmata, one of Mr Fortune's Japanese introductions, and as represented by the plate in the "Botanical Magazine" it promises to eclipse all the red flowerers. Its inflorescence is in great corymbs, and it is evidently as free as the best of them. An oak, as represented in the *Illustration Horticole*, under the name of Quercus robur concordia, is likely to be a useful individual for arboriculture. It is of a golden hue, and considered a beat upon the aurea in cultivation. Lonicera Standishi, named in honour of the introducer at Bagshot, is likely to become sought after. It is an early spring flowering plant, with white flowers proceeding from the leaf axils, having the additional attraction of being fragrant.

The novelties in fruit are necessarily of a more rare kind. In grapes the best thing presented for general approval was the Golden Champion, raised by Mr William Thomson, Dalkeith, and described in our *Almanack* of 1868. It is a cross between the Champion Hamburgh, and the Bowood Muscat, and in respect of earliness of maturity must be classed with the former, while the latter has only invested it with colour. The flavour is not after the Muscat order, neither can it be debited to the Hamburgh; in truth, in point of flavour it partakes of a character quite its own. Size of bunch, berry, and a good constitution are its main features. The Buerre du Cercle, which is highly spoken of by Mr Barron, ranking, in point of season, next to Marie Louise, the flesh of which it very much resembles. Madame Treyve is a summer pear, beautiful to look upon, and melting in the mouth. Apples are best represented by Coole's seedling, exhibited by Messrs Veitch, and received a first-class certificate, and by Annie Elizabeth, which was awarded the same honour when exhibited by Messrs Harrison & Sons, of Leicester. The one which will be sent out from Chelsea is a fine dessert apple of taking colour; the other is a good-sized kitchen apple, and, what is of importance, a fine late keeper.

NEW GERANIUMS.

WITHIN the last year a number of very beautiful seedling Geraniums have been introduced. As these plants are of great interest to amateurs, we give the following list from *The Farmer and Gardener's Illustrated Almanack* recently published. The names of the introducers are printed at the beginuing, and the names of the original senders at the end :—

Achievement (F. & A. Smith).—A golden variegated zonale, with large bold slightly convex foliage, ; fine growth, and compact habit. The zone is very broad, [illegible] intense black, and rich bright crimson, with neat margin of deep yellow, presenting a brilliant combination. [illegible] & A. Smith, 1869.

[illegible] This zonale is the finest in [illegible] fered; the flowers are very large, perfectly formed, and of stout substance; the colour very [illegible] non, flamed with scarlet; the edge of the petals shading off to pure white, and occasionally tinted with carmine; the habit is free, dwarf, and compact; foliage of medium size, bright green, with zone of intense black. A magnificent exhibition plant. F. & A. Smith, 1869.

Ada Mann.—Of medium vigour and foliage; with a cinnamon brown zone, barred and belted with light flame colour, having a broad lemon yellow leaf margin. E. G. Henderson & Son, 1868.

Advancer.—A very rich deep pink self zonale, with large flowers in fine trusses. W. Bull, 1868-9.

Alexander Stewart.—A fine rich foliaged zonale, with immense trusses of large perfectly-formed scarlet flowers. A great improvement on "*David Syme,*" sent out last year by the same firm. Peter Lawson & Son, 1869.

Ambassador.—A strikingly handsome "nosegay," having immense trusses of large and finely formed glowing vermillion flowers. W. Bull, 1868-9.

Andrew Henderson (double flowered).—Of free and busey growth, producing a profusion of very large trusses, each containing 60 to 80 large very double flowers, imbricated like a ranunculus, and of a deep scarlet lake colour. 1868.

Annie Fagot.—A "golden tricolor," or more correctly a quadricolor leaved variety, having a rich deep zone, finely belted with bright flamed red, and golden margined. E. G. Henderson & Son, 1868.

Arab (F. & A. Smith).—Ground colour rich yellow, with broad zone of glossy dark brown (nearly black); foliage large, flat, and of good substance; habit of plant free and branching, with large truss of crimson-scarlet flowers. It is well adapted for bedding purposes. F. & A. Smith, 1869.

Ascendency (double flowered).---Fine large very full flowers, of a beautiful bright rose colour, and in immense trusses. A very good shrubby growing zonale. Wm. Bull, 1868-9.

Auric (F. & A. Smith).—Yellow ground, with broad zone of red brown, and very narrow margin; habit compact and dwarf. A fine and distinct "golden bronze zonale." F. & A. Smith, 1869.

Azella.—A free grower, with slightly zonate leaves; flowers in large compact trusses, bright rosy crimson, upper petals rose, radiating from the centre. B. S. Williams, 1868.

Basilisk.—A cherry coloured zonale, shaded with pink; an attractive novel coloured variety, with fine well-formed flowers. W. Bull, 1868-9.

Beautiful for Ever.—The most brilliant zoned variety in the "golden tricolor" group, the bright scarlet zone being of great width, with a broad bright yellow margin. E. G. Henderson & Son, 1868.

Beautiful Star.—Zone rich flamed red of great breadth, upon a bright lemon yellow leaf margin. E. G. Henderson & Son, 1868.

Beauty of Kent.—Yellow leaf ground, with broad bright chestnut zone, fine foliage and habit. Downie, Laird, & Laing, 1869.

Beauty of Riverdale.—A highly ornamental variety, of vigorous well-branched habit, distinguished by its large velvety surfaced leaves, which are of good substance, well expanded, and well proportioned in outline. Its remarkably large well-defined flame-tinted bronze zone is in beautiful contrast with the rich deep golden yellow disc and margin, which constitutes it one of the finest examples of the broad zoned group. It is admirably adapted for flower-garden groups, also for vase and pot culture. E. G. Henderson & Son, 1869.

Beauty of the Parks.—A fine bronze zoned variety upon a yellow ground. A great improvement upon "Beauty of Oulton," having a large and effective orange scarlet truss. E. G. Henderson & Son, 1868.

Blackband Nosegay.—A handsome and effective variety, of a dwarf and compact habit, in the style of "Garibaldi;" leaf comparatively small, well expanded, of a bright emerald green tint, impressed with a fine olive bronze zone; flowers bright scarlet. E. G. Henderson & Son, 1868.

Black Knight—Leaves bright yellowish green, with a broad dark zone, and wide margin of yellow; habit fine. Downie, Laird, & Laing, 1869.

Bright Eyes.—A "golden tricolor," having a vandyked zone of rich flamed crimson, with pure golden yellow margin. E. G. Henderson & Son, 1869.

Bronze Model.—Velvety-surfaced golden leaf, with fine dark chocolate zone; flowers brilliant orange scarlet, with white centre. E. G. Henderson & Son, 1868.

Bronze Perfection.—Leaf having a very effective dark bronze zone upon a golden ground; flowers brilliant scarlet; habit good. E. G. Henderson & Son, 1868.

Cardinal.—A free blooming nosegay, with good trusses of rose-coloured flowers, which are shaded with carmine, and marked with pink in the upper petals. W. Bull, 1868-9.

Cavalier.—A dazzling and attractive orange vermillion "nosegay," having large trusses of good flowers. W. Bull, 1868-9.

Charming.—Golden leaf ground, with broad bright reddish chestnut zone, and broad golden margin. Downie, Laird, & Laing, 1869.

Charming Bride.—A robust free-growing silver-margined tricolor, having concave leaves, with rich bronze zone, barred with bright rose carmine; flowers brilliant scarlet, and in fine trusses. E. G. Henderson & Son, 1868.

Charming Contrast.—An effective variety, with broad pure white leaf margin; flowers deep rose or pink, elegant and distinct. The only one of this colour of flower having silver edged foliage. E. G. Henderson & Son, 1868.

Cherry Lips.—A seedling from "Christine Nosegay," belonging to the same section; with most profuse flowering, close full trusses of cherry rose scarlet bloom. E. G. Henderson & Son, 1869.

Conqueror (double flowered).---A magnificent variety having fine, large, full, vermillion-coloured flowers, with conspicuous white eyes. Wm. Bull, 1868i9.

Constance.—A free growing "silver tricolor" of compact dwarf habit, having evenly expanded leaves with bronze zone, finely belted with rose; and a beautiful pure white border. E. G. Henderson & Son, 1868.

Coronet (F. & A. Smith).—A very beautiful and vigorous-growing "golden tricolor," with rich broad zone of dark chestnut red, shot with bright carmine red; foliage large and flat, richly coloured, and retained a long time on the plant, rendering it very desirable for either the conservatory, the exhibition, or for planting out. F. & A. Smith, 1869.

Countess of Ashburnham.—A beautiful "golden tricolor" variety, of vigorous growth and branchy habit; leaf of great substance and even circular outline, with brilliant carmine scarlet zone, and pure golden border. E. G. Henderson & Son, 1868-9.

Court Mantle.—A bright cinnamon red zoned "golden tricolor." E. G. Henderson & Son, 1868-9.

Crimson Crowned Canary.—Vandyked olive brown zone, on yellow ground; large rich crimson flowers. E. G. Henderson & Son, 1868.

Creole.—Broad chestnut zone, on a plain leaf ground; in style and habit highly suitable for bedding. Downie, Laird, & Laing, 1869.

Crown Prince.—A fine looking variety, with a high coloured chestnut zone, large, bold, and smooth leaves; distinct and free. Downie, Laird, & Laing, 1869.

Criterion (F. & A. Smith).—Yellow ground, with broad even belt of rich chestnut-red, and neat margin; the leaf is round and flat, of thick substance. F. & A. Smith, 1869.

Curina.—One of the neatest and most effective kinds for small beds or vases, being dwarf, compact, and well branched; with conspicuous white leaf margins, and ample trusses of pure pink flowers. E. G. Henderson & Sons, 1868.

Cynthia.—An effective variety of dwarf and compact habit, with well expanded leaves, of good substance and outline; having very broad creamy white margins, and flame scarlet flowers. E. G. Henderson & Son, 1868.

Dazzling Contrast.—Leaves deeply zoned, on a bright gold ground; flower trusses large, and brilliant orange scarlet coloured. E. G. Henderson & Son, 1868.

Dawn.—Leaf large, smooth, regular in form, and with a broad bright reddish bronze zone on a golden ground; flowers of good form and substance, bright scarlet, and borne well above the foliage on stout footstalks. Wm. Bull, 1868-9.

Delight.—Leaves of perfect form, large, flat, with prominent dark chocolate Vandyked zone on a yellow and green ground; flowers bright scarlet. Wm. Bull, 1868-9.

Director.—Disc and outer margin of leaf greenish yellow, zone dark brown; of dwarf and compact growth, with bright orange scarlet flowers. Wm. Bull, 1868-9.

Display.—Leaves medium sized, with bright golden disc, well defined crimson zone, and bright yellow outer margin; flowers of a glowing scarlet colour large and fine; habit dwarf and compact. Wm. Bull, 1868-9.

Dragon.—Leaves round, flat, of perfect form, and with a broad bold zone of rich chestnut brown, on a pure golden ground; flowers of a beautiful salmon blush colour, freely and finely produced; growth ompact, vigorous and effective. Wm. Bull, 1868-7

Eastern Prince.—A rich carmine crimson-zoned golden tricolor, with fine golden yellow margin. E. Henderson & Son, 1869.

bor.—Leaves of good size, form, and even outline, with a yellowish gold disc, bounded by a broad regular zone of deep chocolate bronze, having a good outer dge. A most effective bedding variety, and highly uitable for plant-house decoration. J. Backhouse & Son, 1868-9.

Eclat.—A slightly zonate "nosegay," of a beautiful mpact habit; flowers of extra large size, fine form, and of a rich shade of magenta suffused with pu trusses larger than those of any other variety, being self-supporting, impart to the plant a appearance. G. Smith, 1868.

Electricity.—A "golden tricolor" zone, splashed with bright flamed crimson, margined pure brimstone yellow. E. G. Henderson & Son,

Elegant (F. & A. Smith).—A very bright pleasing "golden tricolor," with medium-sized fol zone very bright carmine red, with neat yellow gin; leaves slightly convex, freely produced, and retained. F. & A. Smith, 1869.

Emma Cheere.—A "golden tricolor" of mini growth, with well expanded leaves, marked w medium vandyke zone of flaming red, and rich g yellow border. E. G. Henderson & Son, 1868.

Empress of India.—A distinct zonale, with ren ably broad rich crimson red leaf zone, and ros mine scarlet flowers. E. G. Henderson & Son,

Excelsior (F. & A. Smith).—Creamy blush gined "silver tricolor," with bright zone of lake foliage of medium size, and slightly convex; free of growth. A fine exhibition variety. F. Smith, 1869.

Exquisite (F. & A. Smith).—This most distinc beautiful "silver tricolor" is far in advance of a offered for its pure silvery-white margin, and i quisite colouring. The zone is broad, of a brigh lake, mingled with brown, having an ample cen a peculiar blueish green, the whole aspect of the presenting a singularly attractive appearance. foliage is large, slightly convex, and the habit is s and vigorous. F. & A. Smith, 1869.

Fair Emily.—A dwarf and compact "golde color," with leaves of great substance and ci toothed outline, marked with a rich golden ma zone brilliantly belted with flamed red. E Henderson & Son, 1868.

Fairy Spell.—A beautiful and effective branching "golden tricolor," with well-exp leaves of circular outline; the green disc belted a bronze zone, which is finely barred and belted carmine scarlet, upon a broad rich canary yello margin. E. G. Henderson & Son, 1868.

Fairy Visions.—A neat dwarf and compact h "golden tricolor," having leaves of medium size bright brimstone yellow margins, and flame-col zones. E. G. Henderson & Son, 1868.

Fire-Fly.—A fine zonale, with thick she petaled bright vermillion well-formed flowers, in trusses. W. Bull, 1868-9.

Fire-King.—An intensely vivid scarlet zona fine form and good substance; trusses large standing well above the leaves, which are light coloured; habit excellent. B. S. Williams, 18

First Favourite.—Flowers bright orange scarle white eye, in large well-formed trusses; foliage s and slightly zonate; habit good. G. Smith, 18

Flambeau.—A beautiful "tricolor," with fully-expanded leaves, the green centres of whi encircled by a broad brilliant zone of mingled crimson maroon, and bounded by a well-proportioned edge of clear sulphur-yellow. An excellent bedder, of short-jointed bushy-growing habit. J. Backhouse & Son, 1868-9.

Flamingo (F. & A. Smith).—Very rich deep scarlet flowers, of immense size, measuring 2 inches in diameter (style of *Leonidas* but much larger); finely formed; a very free bloomer; habit dwarf and compact. A first-class variety for pots or beds. F. & A. Smith, 1869.

Florence.—A bright rosy cereise zonale, shaded with peach; flowers in large trusses. W. Bull, 1868-9.

Floss.—A "golden tricolor," with "nosegay"-like habit, and flame belted zone. E. G. Henderson & Son, 1869.

Flower Queen.—A dwarf and compact growing "silver edged" variety; leaves of good substance, well expanded, and the dark green disc finely belted with snow white; flowers carmine coloured; a very effective variety for front lines. E. G. Henderson & Son. 1868.

Flying Cloud.—A "silver tricolor," having a rosy carmine zone, belted with a pure cream-white leaf margin. E. G. Henderson & Son, 1869.

Forester.—A very pleasing violet peach-coloured zonale, with pink markings in the upper petals. W. Bull, 1868-9

Gem of Yellows.—Pure golden leaf ground, with lively medium sized chestnut zone, Downie, Laird, & Laing, 1869.

General.—A fine large showy flowered zonale, of a bright orange scarlet colour, with white eye. W. Bull, 1868-9.

Glen Rosa.—A "golden tricolor," with distinct rich-flamed zone. E. G. Henderson & Son, 1869.

Glistening Sea.—A "golden tricolor," with narrow bright carmine zone; and well-defined golden yellow margin. E. G. Henderson & Son, 1869.

Glory of Paris (double flowered).---A vigorous growing, bold and effective variety, with large compact trusses of rich crimson double flowers. E. G. Henderson & Son, 1869.

Glow. — A dark marked zonale, with brilliant scarlet flowers, in large well-formed circular trusses. Geo. Smith, 1868.

Gold-finder (F. & A. Smith).—This "golden bronze zonale" has fine large bold foliage, slightly convex; pale yellow ground, with rich broad zone of bright chocolate-red; the growth is free and compact. F. & A. Smi-h, 1869.

Golden Beauty.—One of the best golden selfs yet raised. The leaves are round, even in outline, and of a pure bright yellow colour; habit vigorous, but compact and neat. W. Bull, 1868-9.

Golden Eclipse.—Habit dwarf, and compact with circular lobed leaves; the rich dark chocolate zones finely effective upon a golden leaf ground; flowers bright scarlet; beautiful in groups or vases. E. G. Henderson & Son, 1868.

Golden Model.—Large circular evenly surfaced leaves, with fine dark zone on yellow ground; flowers orange scarlet; a bold effective varied with beautiful symmetrical leaves. E. G. Henderson & Son, 1868.

Grand Duke.—A magnificent zonale, of a deep orange scarlet colour, and with bold well-arranged circular trusses. Geo. Smith, 1868.

Guardsman.—A very showy and effective "nosegay," producing large well-formed globular trusses of fine, bright, dazzling vermillion-coloured flowers. W. Bull, 1868-9.

Happy Thoughts.—A "golden tricolor," with cinnamon red zone, richly shaded and barred with rosy carmine; margin pure canary yellow. E. G Henderson & Son, 1869.

Harrison Weir.—A fine bold variety, in the way of *Countess of Kellie*, with smooth flat leaves of great substance. Downie, Laird, & Laing, 1869.

Heroine.—A white zonale, slightly tinted with black in the centre. W. Bull, 1868-9.

Hogarth. — An exceedingly rich and attractive coloured zonale, having bright rosy salmon white-eyed flowers, of good form and substance. W. Bull, 1868-9.

Howarth Ashton.—An exceedingly rich and beautifully marked "golden tricolor;" leaves of circular outline, and great substance, with a well-proportioned rich golden margin; the disc surrounded with a broad bronze zone, brilliantly suffused with flamed scarlet; growth vigorous and free, retaining its beautiful leaf tints throughout the year. E. G. Henderson & Son, 1868.

Humming Bird.—A "golden tricolor" in the style of *Lady Cullum*, having a broad metallic bronze zone, margined with rich flamed crimson in summer, and retaining a picturesque character by its violet rose tints in winter. E. G. Henderson & Son, 1868.

Imogene.—Plain silver leaf margin. E. G. Henderson & Son, 1869.

Ingham Beauty.—A "silver tricolor," of dwarf densely compact habit; zone belted and suffused with rosy violet; flowers large, and rich scarlet. Specially adapted for small groups and front lines. E. G. Henderson & Son, 1868.

John Williams.—A robust, free branching, dark, horse-shoe leafed variety from Ballarat, Victoria; having rich salmon pink flowers, slightly shaded towards their margin, light eye, above the average size, perfect in shape, and of good substance; trusses large, compact, upon stout stalks, and thrown well above the foliage. Invaluable either for pot culture or bedding purposes. B. S. Williams, 1868-9.

Kentish Fire.—A nosegay variety, with large symmetrical trusses; flowers of a deep orange scarlet hue, and dark green leaves breaking into a kind of greenish gold; habit good. Downie, Laird, & Laing, 1869.

King of Pinks.—Growth vigorous and free, with well expanded rich velvety green leaves, and remarkably large trusses of clear rosy pink flowers; an effective variety. E. G. Henderson & Son, 1868.

Lady Londesborough.—A "tricolor," with perfectly round and flat leaves, about 4 inches in diameter, light green, and marbled in the centre, surrounded with a brilliant circle of scarlet flamed crimson, on a dark ground, evenly margined with yellow ; habit vigorous. B. S. Williams, 1868-9.

Lady Palace.—Centre yellow, rich bronze zone ; flowers in large trusses, and rosy salmon colour. E. G. Henderson & Son, 1869.

Lady Sheffield.—A fine improvement upon *Sunset* in its more brilliant and enduring zone tints ; leaves even, of good substance and circular outline. Of free growth, and retains its leaf tints throughout the winter months. E. G. Henderson & Son, 1868.

Landscape.—Fine rich foliage, with small bright disc, Vandyked zone of reddish brown, and pure sulphur yellow outer margin. W. Bull, 1868-9.

Lilliputian, Baby Boy.—Scarlet with white eye. This and the next eight form a new race of green zonales, combining vigorous and compact dwarf growth with small foliage and full-sized blooms. They originated in Saxony, from whence they were introduced, and offered to British growers, by Messrs E. G. Henderson & Son, in May 1868.

Lilliputian, Cupid.—Light copper rose, with white centre.

Lilliputian, Little Dorrit.—Salmon rose, with white eye.

Lilliputian, Little Dear.—Delicate rose, with white spots.

Lilliputian, Little Gem.—Brilliant vermillion, with white centre.

Lilliputian, Little Harry.—Carmine scarlet, with white eye.

Lilliputian, Pretty Jemima.—Brilliant scarlet, and white centre.

Lilliputian, Rustic Beauty.—Carmine, with white centre.

Lilliputian, Tom Tit.—Brilliant scarlet, with white eye.

Little Beauty (F. & A. Smith).—A very pretty miniature "silver tricolor," of diffuse habit ; blush white margin, with rosy purple and black zone ; foliage dense ; under medium size ; healthy constitution. F. & A. Smith, 1869.

Lord Stanley (F. & A. Smith).—Flowers of good form, borne in large globular trusses, freely produced ; colour of the richest possible shade of bright deep scarlet, with very conspicuous white eye ; habit exceedingly dwarf ; free and compact. A splendid acquisition. F. & A. Smith, 1869.

Lucifer.—A fine huge trussed zonale, with rosy rose, flowers, having light markings in their upper petals. W. Bull, 1868-9.

Luminator.—Leaf with a splendid chocolate Vandyked zone, on a bright golden ground ; flowers cerise, shaded with scarlet, of good form, and in fine trusses. A distinct, striking, and attractive variety. W. Bull, 1868-9.

Madame Lemoine (double flowered).—Habit of growth free and compact ; trusses remarkably large, containing 60 to 80 very double rose-coloure
soms, each of which are ¾ of an inch in di
1868.

Madame Rose Charmeux (double flowere
"Tom Thumb" habited, profuse blooming,
scarlet flower variety ; forming a first-class
plant, and well suited for pot culture. E. G
derson & Son, 1869.

Magnificent.—Broad, bold and bright chestn
on a golden leaf ground. Downie, Laird, &
1869.

Mariner.—Leaves with a fine vandyked
rich bronze, on a splendid gold and green g
flowers bright firy scarlet ; of excellent hab
robust growth. W. Bull, 1868-9.

Mary Elizabeth Tomkins (double flowe
Flowers perfect in form, of a very pleasing s
colour, with light centre, and produced in en
trusses. Wm. Bull, 1868-9.

Mary Hadwin.—A "golden tricolor," wit
green leaf centre, and rich red crimson zone.
Henderson & Son, 1869.

Melody.—A "golden tricolor," with olive
richly belted with deep rose carmine. E. G. H
son & Son, 1866.

Miss Beatrice.—A very beautiful "golden tri
of dwarf vigorous growth, and well-branched
with fine properties as an exhibition plant, and
the most effective for garden groups. Its lea
nearly circular in outline, of requisite substan
size, evenly expanded, and well defined, th
bronze zone forming a fine contrast with its r
ably bright golden broad leaf margin. This
is greatly in advance of numerous others, who
dominant merit is their excess of coloured zone,
exclusion of those finely harmonized proporti
leaf and flower tints which constitute the relati
fection of beauty in plants. E. G. Henderson
1869.

Miss Burdett Coutts (F. & A. Smith).—For
of colouring this "silver tricolor" is pre-emine
margin is blush, with a broad zone of rich purpl
son of the brightest hue ; habit free and robu
may be safely pronounced indispensable for exh
purposes. F. & A. Smith, 1869.

Moonbeam.—A free and vigorous variety
creamy white leaf margins, and carmine rose
flowers brilliant carmine scarlet, in large t
forming an effective and distinct summer bed or
E. G. Henderson & Son, 1868.

Mrs Gladstone.—A beautiful and distinct "
tricolor," with a rich carmine crimson zone
marked improvement in its section. E. G. Hen
& Son, 1869.

Mrs F. Hokler.—Leaves pale green, changi
yellow with age ; zone dark, narrow and irre
Downie, Laird, & Laing, 1869.

Mrs Lewis Lloyd.—Pale yellowish leaf ground
narrow chestnut zone, changing to bronze wit
Downie, Laird, & Laing, 1869.

Mrs Maynard.—Golden leaf ground, with striking one of bright reddish chestnut, and broad golden margin. Downie, Laird, & Laing, 1869.

Nabob.—Flowers bright rose, shaded with peach; an extremely pleasing coloured zonale. W. Bull, 1868-9.

Nelly Ray.—An excellent "golden tricolor," of dwarf and compact growth; leaves evenly expanded, and circular in outline, showing a beautiful medium bronze and scarlet zone, upon a rich sulphur yellow border. E. G. Henderson & Son, 1868.

Oracle.—A deep rose tinted with violet, soft and pleasing coloured "nosegay." W. Bull, 1868-9.

Peter Grieve.—An excellent "golden tricolor," in which is combined the rosy crimson tints of *Lucy Grieve*, with the free, vigorous growth and bedding properties of *Mrs Pollock*. E. G. Henderson & Son, 1869.

Philippa.—A dwarf and compact growing "golden tricolor," with well-proportioned golden yellow leaf margin, and a bright carmine red zone. E. G. Henderson & Son, 1868.

Portia.—Leaves with a fine bold dark crimson zone, on a bright golden ground; flowers of a beautiful rosy pink colour. A striking and handsome variety. W. Bull, 1868-9.

Premier.—An extremely pretty zonale, with nice shaped flowers, of a beautiful pink-peach colour. W. Bull, 1868.

Princess Dagmar.—A zonale, the result of a cross between the well-known *Madame Vaucher* and *Beauté Surseries*, partaking of the habit of the former, and eclipsing the good qualities of the latter, having the upper half of the petals white. B. S. Williams, 1868.

Queen of Harvest.—Habit dwarf and compact, with rich velvety-surfaced green leaves and light zone; flowers of a bright rosy pink colour, in large trusses. A gay and effective variety, distinguished by its green flower scapes and red pedicles. E. G. Henderson & Son, 1868.

Queen of May.—A handsome "silver edged nosegay," with broad white leaf margins, and bright lake crimson flowers. E. G. Henderson & Son, 1869.

Queen of Nosegays.—Brilliant crimson flowers and large trusses; a profuse bloomer. E. G. Henderson & Son, 1869.

Queen of Roses.—A strikingly effective rose-coloured "green zonale," with large full well-formed trusses. E. G. Henderson & Son, 1868.

R. K. Bowley.—A splendid brilliant crimson nosegay, with flowers of the best form in fine large trusses; a first-rate variety, of excellent habit. Downie, Laird, & Laing, 1869.

Reindeer.—A "golden tricolor," with olive brown Vandyked red zone, richly belted with carmine. E. G. Henderson & Son, 1869.

Retaliator (a).—This is the largest leaved "golden tricolor" yet offered, measuring from 5 to 6 inches in diameter; habit of the plant vigorous and branching; the colours are exceedingly bright, glowing crimson and brown zone, with very wide and even yellow margin; the foliage is round and slightly convex. F. & A. Smith, 1869.

Reticulatum—A unique and singularly beautiful variety of the nosegay section, with leaves elegantly netted or traversed during the winter and spring months, with golden veins upon a green ground; and through the dry summer months finely marked with a tracery of green net-work upon a golden ground; growth dwarf and densely compact, with fine trusses in the style of *Stella*. E. G. Henderson & Son, 1868.

Red Ring.—Zone vivid reddish chestnut, on a bright golden leaf ground; a distinct variety, of good habit. Downie, Laird, & Laing, 1869.

Rosetta (double flowered).—Flowers of a beautiful rose colour, extremely large, very double, and in immense trusses; a free, blooming variety. Wm. Bull, 1868-9.

Rossini (F. & A. Smith).—Colour a bright shade of cerise scarlet, with small white eye; flowers of fine form, in good trusses, freely produced; habit very dwarf, compact, and free; extra firm. F. & A. Smith, 1868.

Rosy Gem (F. & A. Smith).—A hybrid nosegay; colour glossy rose-pink, tinted with carmine, and with large white spot on the base of the upper petals; habit very dwarf and free; foliage pale green; trusses of good size; a very free bloomer, and very beautiful decorative plant. F. & A. Smith, 1869.

Rustic Beauty.—A unique feature in the "golden tricolor" section, from having clear white flowers, leaves roundly lobed, with a light flame-coloured zone, and having a bright lemon yellow border; habit dwar and compact. E. G. Henderson & Son, 1868.

Senator.—A "nosegay," having fine large trusses of finely-formed bright scarlet flowers, of good substance. W. Bull, 1868.

Shakspere (F. & A. Smith).—Colour of zone bright carmine red and black, with rich yellow margin; plant vigorous, and freely branching; foliage medium-sized, flat, and very enduring. From its bright and lasting colours and hardy habits, this "golden tricolor" forms a noble exhibition or decorative plant. F. & A. Smith, 1869.

Signor Mario.—Greenish gold leaf ground, with bright bronzy zone. Downie, Laird, & Laing, 1869.

Silver Cloud.—A compact and free-growing "silver tricolor," with wide expanded foliage; bronze zone, finely belted and barred with flame rose colour; flowers rich scarlet. E. G. Henderson & Son, 1868.

Silver Pheasant.—A unique white-flowered variety, with effective bronze zone upon yellow ground. E G. Henderson & Son, 1869.

Splendour (double flowered).—Flowers of immense size, very double and of a dazzling vermillion colour An attractive variety, of good compact growth, having dark-zoned leaves. W. Bull, 1868-9.

Sofrano.—Neat circular lobed leaves, with very effective chocolate red zone, on golden leaf ground and proportioned outer margin. E. G. Henderson & Son, 1869.

Stanstead Beauty.—Bright pale yellowish green leaves, with broad dark bronzy zone ; the leaves large, of good form and striking appearance ; habit good. Downie, Laird, & Laing, 1866.

Star of Gold.—A rich tinted "golden self," of dwarf and compact habit ; very effective. E. G. Henderson & Son, 1869.

Star of Lyons (doubled flowered).—Of dwarf and compact growth, having close trusses of crimson flowers. A good variety for pot culture, and conservatory or house decoration. E. G. Henderson & Son, 1869.

Star of the North.—A fine horse-shoe leafed variety, of a rosy crimson colour shaded on yellow ground ; a large petaled cross from *Indian Yellow.* B. S. Williams, 1868.

Star of the West.—A "golden tricolor" having an olive brown zone, belted with rich carmine, and margined with a rich lemon yellow leaf border. E. G. Henderson & Son, 1869.

St John's Wood Star.—A beautiful and effective variety, with brilliant red zone, upon a yellow ground, and with a pure golden outer leaf margin. E. G. Henderson & Son, 1869.

Summit.—Leaves large and smooth, of a pale yellow colour, effectively zoned with a broad band of rich chocolate ; flowers bright scarlet with white eyes. A splendid variety. W. Bull, 1868-9.

Sunny Smile.—A beautiful silver-margined "silver tricolor," with rosy carmine zone ; of good substance and outline. E. G. Henderson & Son, 1869.

Sunnyside.—A very distinct free blooming zonale, with salmon coloured light-eyed flowers, and half of the petals blush. W. Bull, 1868-9.

Sunrise (F. & A. Smith).—Bright clear yellow margin, with very bright zone of orange red, marked with dark chestnut ; foliage of medium size, slightly convex ; habit of plant free and branching. This is a very pleasing, bright, and distinct "golden tricolor." F. & A. Smith, 1869.

Sybil (m).—This is a beautiful, very dwarf "golden bronze zonale," of free and compact habit ; the foliage is of medium size ; the ground colour rich yellow, with very broad zone of deep chestnut-brown, and very neat and narrow margin. It has proved one of the best for enduring the heat and glare of the sun during the past summer, and is confidently recommended as a first-class bedder. F. & A. Smith, 1869.

Talisman.—Leaves with dark crimson, rich Vandyked zone, on a yellow ground ; flowers rich carmine, borne in large trusses, and contrasting well with the foliage ; of a neat compact habit, and a profuse bloomer. W. Bull, 1868-9.

Tamworth Pet.—An elegant "silver tricolor" of miniature growth, and densely branched habit ; each leaf marked with a beautiful rosy red zone ; flowers of light salmon colour. E. G. Henderson & Son, 1868.

The Moor (F. & A. Smith).—Rich soft yellow ground with broad zone of black brown, and wide margin ; foliage large and round ; habit free and compact. This "golden bronze zonale" is very conspicuous for its distinct contrast of colours, which are very enduring. F. & A. Smith, 1869.

The Queen.—Unique and distinct in its section, having pure blush white flowers, with narrow dark leaf zone, on a golden leaf ground ; remarkably dwarf in growth. E. G. Henderson & Son, 1868.

Tricolor Nosegay.—A miniature "nosegay variety," forming an attractive bed by its remarkably dwarf, densely branched growth, and well expanded leaves, which are distinctly bordered with cream-yellow when young, that afterwards merges into white. E. G. Henderson & Son, 1868.

Trojan.—Leaves round, of perfect form, good substance, with pure sulphur disc, bright yellow margin, and bold effective bright chestnut brown zone ; flowers bright carmine, borne well above the foliage and retentive of colour to the last. W. Bull, 1868-9

Valpariso.—A "golden tricolor," having olive brown zones, richly barred with flamed red. E. G. Henderson & Son, 1869.

Vernon.—A "silver tricolor" of neat compact branching habit, with evenly expanded leavess which have uniformly broad white borders, and rich rose colour zones ; flowers carmine rose, distinct and effective. E. G. Henderson & Son, 1868.

Viceroy (F. & A. Smith).—Flowers scarlet cerise, of fine form ; a free bloomer, and has good trusses ; habit free, dwarf, and compact ; foliage small, with narrow zone. A good bedding variety. F. & A. Smith, 1869.

Victor (double flowered).—Flowers of a bright orange scarlet colour, striped and flaked with white. One of the most showy and conspicuous in its section. W. Bull, 1868-9.

Victoria Regina.—A fine improvement upon that well-known "golden tricolor" *Mrs Pollock,*" by its more vigorous and freely branched growth. E. G. Henderson & Sons, 1869.

Violacea coccinea.—A profuse blooming zonale, with fine trusses of rich violet tinted scarlet flowers, and conspicuous dark leaf zones. E. G. Henderson & Son, 1869.

Grevillea Banksi.—A highly ornamental Australian evergreen shrub, the flowers of which grow in dense ovate-cylindrical erect terminal racems. W. Bull, 1868-9.

Hakea spinosa.—A remarkable growing rigid evergreen Australian shrub, of branchy habit, clothed with needle-shaped leaves 1½ to 2 inches in length, and terminating in a sharp spring point. W. Bull, 1868-9.

Lastsea Floridana.—A handsome robust-growing evergreen fern, noticeable for the deep green colour of its bipinnate fronds, which are of a broad lanceolate outline, and 1½ to 2 feet in length. A native of East Florida. W. Bull, 1868-9.

Rambles by Road, River, and Rail.

A TOUR IN THE WEST OF SCOTLAND.

V. BARGANY.

preconcerted arrangement we were to have an opportunity of inspecting the ; and the more interesting features of asure-grounds of Bargany, before our ; for the day were completed. The e from Kilkerran to the place in ques- ll be from 5 to 6 miles, and the drive n the two places, on an early autumn on, was of a particularly pleasant cha-

The fields were waving with quite rage crop of cereal produce, while the crops were by far the finest that met e over any of the western counties of nd. The district had not been ex- d from the visitation of a drought farmers, and husbandmen generally, ot likely soon to forget, but it ot seem to exercise that parching ce upon the crops which was tably visible in the border counties. er this was due to the extra depth of lth of the locality, and thereby pre- g greater facilities for the operation and quent beneficial influences of capillary tion, or whether to an occasional re- ng shower, we cannot tell. It was plea- in the midst of the dearth of green that prevailed, to see fields of turnips ing the drills as in usual seasons. More ularly would we refer to the farm oorstown, tenanted by Mr Craufurd acken, which, judging from a rapid y, was well cared for and managed ghout. It appeared to be unusually sheltered, by the range of Hadiard on the one side, and an elevated pla- on the other; but, notwithstanding t was not difficult to divine that the t was a spirited farmer, and it is to be hoped, in the interests of agriculture, that his investment proved remunerative. As we near the village of Dailly we observe a castellated old ruin, conspicuous by its dismantled battlements, which turns out to be an appanage of Dalquharran. The modern residence which is in contiguity is occupied by the Hon. T. F. Kennedy, at one time Commissioner for Woods and Forests, and is snugly esconced among a clump of trees. It was built in 1780, and is considered to be the finest building on the banks of the Girvan. The village of Dailly is low-lying, with a lot of nondescript houses huddled together, and narrow streets conspicuous for filth. Little wonder that cholera made such desperate and fatal inroads upon the population in 1849. It is high time that the parochial board of that and similar districts should put the "Drainage Act" in force, to carry off the sewage and filth, for the weal of the inhabitants.

Passing out of the village, and following the Girvan road, the woods of Bargany are before us. They are miles in length, on either side of the river Girvan, rising up like a huge amphitheatre, and are consequently imposing and interesting. Access to the mansion can be had from two main approaches, the one and principal from the Girvan road, the other from Dailly. The mansion is like a gigantic farm-house of the olden style, with its white-washed walls, and square outline, embroidered with lots of climbers, trained up lattice-work. It is presently tenanted and owned by the Duchesse de Coigny, a great admirer and patron of horticulture and arboriculture. The principal trees that strike one, from their great bulk and imposing appearance, are beeches. Many of these are growing in the plantations, and flank the carriage drives. We measured some of them 12, 14, and 16 feet in circumference. Ash and chestnut predominate, too, while the sycamore and the lime are by no means unfrequent. Elm and oak are in a minority throughout the portion of the woods we were enabled to pass through. As a rule, from the prevailing moistness of the locality, many of the trunks and branches of the trees are infested with lichens, in some respects quite covered over as with a carpet. These parasitical examples of vegetation bode no good, and it seems strange why such dimensions has been attained by the worthy denizens of the forest. One thing, the trees are more remarkable for girth than stature, which partly must be debited against the parasites. On the contrary, any example there is of the coniferous family manifests rude health, and great liking for the home of its adoption. Chinese and Siberian arbor vitaes had attained great stature, making immense conical-looking statues of vegetation. Scotch fir was also conspicuous, bidding defiance to any puny marauder. The more modern plantations of the rarer kinds were pictures of health, no matter whether it was Picea nobilis, or P. pinsapo, or P. Nordmaniana, or the more *noli-me-tangere* looking Chili pine (Araucaria imbricata). They adorned the lawns in which they stood as isolated individuals, and bid fair to have a propitious future. The lawns and carriage drives were in an excellent state of keeping, and gave quite a character to the surroundings.

Turning our attention to the garden, we find, as is the case at Kilkerran, that the flower garden may be said to be a continuation of the kitchen gardens, having a common boundary wall as a line of division. This seems in the more antient period of the history of gardening, even up to the dawn of the present century, to have been insisted upon by some of the landscape gardeners of the day. Now, with our more ambitious notions of refinement and elegance, it would not be tolerated, unless the place was circumscribed Some intervening space, suitably clothed at least with suffruticose plants, if not with arborescent ones, and laid out according to collateral bearings, may be held as a rule absolute with the landscape gardener of modern times. Speaking, however, to the flower garden under review, there were some nice pictures in it. These little miniature pictures of bedding-out plants, in their detached position, were wonderfully enhanced by the luxuriant specimens of hollies, quite 24 feet high, with their green and gold undulated surface leaves; one of the most splendid araucarias we have seen, of faultless symmetry and of great luxuriance, quite 3 feet in circumference at the bole. These things, when they get up to some size, are not only imposing and beautiful of themselves, but they invest all the smaller fry with a reflected dignity. Cupressus Lawsoniana, too, had reached 15 feet in height, and of proportionate features to the waving branches that reclined upon the grass cushion; while clumps of rhododendrons and azaleas, with foliage of admirable finished lustre, toned down the *abondance des richesses* which fields of foliage and flower presented. One of the very finest and simplest combinations, in foliage and flower, that ever met our gaze, was so made up. It was a border parallel to, and adjoining the boundary wall, planted after the panel fashion of adornment. The panels or centres were Lobelia speciosa in mass of blue, surrounding a centre plant of Lobelia *Feu de Roi*, while the great mass of groundwork was Cerastium tomentosum quite full and intensely beautiful, running up to a wall festooned with varieties of ivy, jasmine, clematis, and the white magnolia. The mass of hoary groundwork, lighted up with the intense blue, and the vari-coloured foliage and flowers on the wall, with the other subjects, such as have been already named throughout the garden, gave it quite an aristocratic appearance, which few can appreciate unless the picture was reproduced. Individual plants, with the graceful filiform-like inflorescence of Humea elegans, were set in among the beds; and clumps or masses of pampas grass shone out at intervals with much effect. Pelargonium and verbena beds were very vivid in scarlet, and purple, and pink, the immense bouquet-like masses of the crimson Stella

ıg out in prominent significance. Roses
ıd been budded in April were blooming
ust, so comfortable and coaxing appears
heir habitat.

ıse-plant accommodation is upon a
rhat limited scale. Like numbers of
nen's places, fruit and vegetables are the
hings in demand, and the supply must
ered for accordingly. In a greenhouse
ove we observed, among other things,
t interesting and valuable climber for
ıl use, which may be earnestly recom-
ed to all growers of greenhouse plants.
me is Rhodochiton volubile. Its foli-
handsome, of a claret hue, with a pro-
of flowers bearing pink calyxes and
black tubular corollas, which character-
as a figwort of no ordinary importance.
ıer old plant was conspicuous, running
e long rafters of the house in which it
growing, and which is not usually so
d. It is the Abutilon striatum. Cul-
d as a standard it generally is leggy and
but used as a climber it is by no means
ensive to the eye, and its flowers are so
ful that all who see them once won't
forget them again. Hibiscuses of sorts
cultivated, the double whites being the
ites; but, in our opinion, there is no-
to equal the single varieties, especially
orts as rosea Sinensis, Jerroldianus, and
like, which are so profuse and capti-
in infloresence, although individually
lived—only lasting a single day. In
ove department drapery was admirably
vised by the slender stems and beauti-
liage of the Cissus discolor, while
ıs, alocasias, caladiums, and such
of a soft nature were growing into
lunged in the prepared bed. A speci-
f Cycas revoluta was in extra fine trim,
re in the stem, and the fronds arching
sides in great beauty.

kitchen garden is somewhat curiously
ed, bounded on the one side by a
l wall. The forcing houses are ranged
at one end of it, separate and distinct
he usual northern boundary wall, and
ff by an auxiliary wall from the kitchen
ng department. Wall-fruit does tolerably well, as it ought to do with such a climate. Apricots are by no means to be depended upon, requiring protection from spring frosts. Even peaches are treated to a case, as the better surety for a good and steady crop. Morello cherries, and red currants for late keeping, were in luxuriant style. The small fruit here, as at Kilkerran, and generally in Ayrshire, were all that could be desired. Apples and pears, as standards, were more than usually numerous over the quarters and in good order.

The forcing houses are so arranged, from the highest lean-to houses at back, to the low frames in front, so as to give all full command of sun and light. With reference to the vineries there is this instructive lesson to be learned, that such plants, whose roots are wholly confined within the precincts of the house, proved to be the best producers of high coloured fruit. In corresponding houses, where the roots had outer borders, the same success was not visible. It seems to be a great question this vine question, getting more elaborate as growers either cite their practice, or somebody else for them. Some prefer heated borders, others unheated, some inside borders, others outside, or a combination of both; some prefer mulching, others fill their borders with a host of flowering plants, and all are successful. To the tyro this is rendering a confusion of ideas worse confused, and a regular clearance up would be very desirable. Some day we will take up the subject, and endeavour to elucidate the contrarieties of our great growers. Meantime it may be said that much depends upon locality, subsoil, and general management. In Mr Smith's case, the plodding gardener at this establishment, it was clearly reducible to the cold substratum of the exposed border, and the copious supplies of rain that usually visit the district. The Muscat houses contained full crops of fine fruit of the Muscat of Alexandria, and the Bowood Muscat. These sorts are so similar as to be about as undistinguishable to the general onlooker as one fine-named self pansy from another. In this case the Bowood had not only denser bunches, but they were the larger of the two, only, if any one were cutting two bunches promiscuously of both so-called sorts, he would be a clever pomologist who could tell which was which. Some capital late grapes were to be seen in the shape of Lady Downes. Others of this distinct variety, in a house heated with flues, had been influenced by sun-stroke, and probably insufficient ventilation combined, which brought on those hard-like indentations, commonly known as spot. It mars the appearance of the fruit much. Muscat Hamburghs were in extra fine condition, large in bunch, in berry, and black as sloes; they were, indeed, the pink of perfection in the one house, and in a house similarly situated in all respects as to aspect, mode of heating, border, and routine of management, they were many points weaker in merit. Of course, there must be a reason for such disparity, but it must be sought after on other than mere superficial grounds; and it is in the investigation and knowledge of the causes of such anomalies, that even the best practical gardeners fail, and fail conspicuously. The fruit of the early Hamburgh houses were partially cut, but what remained attested that the bunches were moderate in size, well up in colour, and of good flavour. The plants were properly enough confined within the walls of the house, where the roots had been as well cared for as the stem and the branches. Along with the standard sorts named were West's St Peter's, in fair condition, and much thought of for late keeping. A grape under the name of Charlesworth's Tokay, appeared to be none other than the Muscat of Alexandria. Verily, with all the care that nurserymen and dealers endeavour to select sorts, there are some yet sent out with wrong names, which is not only an egregious blunder, but an unpardonable offence. For example, if a grower has made up his mind to have Black Hamburgh and Muscat Hamburgh, and gets instead some rubbishy sorts, it is several years before he may be able to prove them, and then it is *so many years lost.* Some of the older vines have been cut back in recent years in order to have vigorous young wood. These vines were accustomed to shank badly, and Mr Smith, after examining the borders, found that the drainage was imperfect. He therefore set about digging a deep main drain, and intersecting drains, and since that operation has been completed shanking has never taken place. How important and suggestive to every grower is the divulging of a fact, bearing upon a method of culture pregnant with the most baneful effects, and the antidote administered, afterwards proved to be effectual!

Peaches and melons are largely cultivated, the latter chiefly with such fermenting material as stable manure and tan. From either of these helps there seemed to be abundant heat to grow and mature first-rate melons, and plenty of them.

It is now time, however, to rest from the literary labours of the day, return with all speed to Kilkerran, in order to have an hour's sport with the gun before sunset, have a little table-talk on professional and political matters, retire to rest, and prepare on the morrow to visit Inch Castle, and Castle Kennedy, *via* Girvan, and from thence by the usual daily coach, or diligence, to Stranraer.

THE VALE OF THE COQUET.

THIS [illegible] Northumberland possesses much [illegible] interest to lovers of rural life. Rising amongst the hills, which divide Northumberland from Roxburghshire, the Coquet passes through scenery of the most diversified character. Near the source of this river the country is wild and grand in the extreme; the greatest portion of the district is occupied by hills of considerable elevation. These hills are covered by a sward of excellent grass of the finest quality, and are well suited for the pasturing of sheep. There is little or no arable land in this district. West of Alwinton the country is entirely grass. There is no heather, and no trees, excepting a few dwarf specimens growing amongst the rocks on the ridges of the hills. The Coquet follows a very irregular course down to this village, and offers splendid sport to the angler. We have heard of five or six dozen being captured by a single rod. The worm is the favourite bait; the fly appears altogether distasteful to the fish; possibly, in the deep pools the minnow would do some execution, but we have not heard of any instances of its having been recently tried. After passing Alwinton, the country is more wooded; near Harbattle there are some good plantations of firs, and there is more cultivated land in this district. After leaving Harbattle, the general course of the river is eastward; however, it follows a very circuitous course; the valley now becomes wider, and cultivation much more general. The hills in the neighbourhood of Harbattle are covered with heather, and afford little food for sheep; but game is plentiful in this district. There is a good deal of valuable grass land between Harbattle and Hepple, locally called "haugh land," on which sheep are pastured. Past Hepple, Flotterton, and Thropton to Rothbury, the Coquet pursues a very zigzag path. In this portion of the river the fishing is good, especially for the few miles after leaving Hepple, a succession of stream and pool affording water that cannot fail to please the most fastidious angler. The trout in this part of the river are very small, though every pool and stream is full; in a dish of three or four dozen it is seldom that four or five of the fish exceed half a pound in weight. A few of the small proprietors have attempted to form an association for the protection of the fish in this and the eastern portion of the Coquet; they certainly have been successful in stopping a good deal of fair angling; but whether they have at all succeeded in checking the poaching is open to doubt. We cannot, however, complain of the majority of the proprietors, for we are acquainted with very few instances where permission to fish has been refused. It would, however, be a graceful act if, when giving permission, the proprietors would erase one or two of the bye-laws on the permission card, and not spoil the kindness of the act by enforcing such conditions as oblige the angler to return to the water nine out of every ten fish he catches. We know of some instances in which this has been done; but, unfortunately, these are exceptional cases. We cannot understand how it is that the county police, from Harbattle downwards, can find so much time for wandering at the water-side; surely, if they cannot find anything better to do, the county might be relieved of their salaries. If proprietors will encourage fair anglers, they need be in no fear of poachers, for it will be the interest of all to protect the water. It is sadly at variance with one's surroundings fishing under the inspection of a blue-coated spy.

Last year, there was great despair among the farmers from the long-continued drought; but surely if the turnip crop should fail, farmers need not be altogether helpless; there are several other crops they can grow for winter and spring consumption, such as cabbage, rape, vetches, rye, Italian ryegrass, &c. They must provide for the month of March, April, and May; let them consider what crops will best meet their wants, and give up their lamentations about the weather. We never could understand why the Coquetdale farmers should be so careless regarding water meadows; for if these were properly worked, sheep might be grazing knee-deep in excellent grass, grown by irrigation in seasons of the greatest drought. A great deal of the grass haughs are sadly overgrown with thistles; these at any rate ought to be kept down. It is a great hardship, for farmers lower down the river, to have the seeds of these thistles deposited on their land, when, after heavy rains, the river floods their haughs. The fact that the Coquet rises so suddenly, and floods the low-lying land adjoining, has been advanced as a reason. Why, nothing has been done for the improvement of this haugh land. It is certainly true that the river does rise suddenly, and to a considerable height. However, we have no doubt that if the proprietors of this haugh land were to associate together, they could, by the removal of impediments to the free flow of the water, by straightening some of the bends, and by an embankment, judiciously placed here and there, reduce the frequency of these floods, and render them less injurious to the surrounding country.

After passing Rothbury, the valley becomes suddenly contracted. The village of Rothbury is well situated. It stands at least 500 feet above the sea-level, and being protected on the north, east, and south by hills of considerable elevation, enjoys a much milder climate than many localities situated a good deal further to the south. It is now a favourite place of resort during the summer months by residents of Newcastle and neighbouring towns. The village itself contains nothing of interest. Through the enterprize of a few gentlemen, it is now supplied with capital water; a few trees have been planted, which will ultimately improve its appearance; however, much is yet to be done before the village will have a satisfactory appearance. Many of the residents obtain a livelihood by letting lodgings; but there is a great want of proper accommodation for visitors. Judging from the quality of the milk and butter supplied, dairy management is not well understood in the locality. We have seen as good milk supplied to the residents in the east end of London, as the farmers of the neighbourhood think good enough for the visitors who honour Rothbury with their presence. It surely is not too much that in Rothbury an abundance of pure milk can be obtained at a reasonable price. It is strange the local farmers are not alive to their interests. Labourers are well employed in this district, at good wages. During the past four or five years, the demand for labourers has been greatly increased, which is partly due to the railway in progress, and to the extensive operations undertaken by Sir William Armstrong, near Rothbury. The country in the neighbourhood is beautiful. Within half an hour's walk of the village, on the north side, are hills 1000 to 1200 feet in height, from the tops of which a fine view of the surrounding country can be obtained. That of the hills near Rothbury are covered with heather, and are not of much value to the farmer; but they are generally well stocked with game. Most of the proprietors are very liberal in allowing free access to the hills, the walk on which forms one of the greatest charms it has for the visitors.

For the first few miles after leaving Rothbury, the country through which the Coquet passes is wild and picturesque. There is little or no cultivated land until after passing Pepper Haugh. Further on, the country is beautifully wooded. Near Weldon Bridge the banks of the river are higher, and the river is confined in much narrower limits. Trout are beautiful in this part of the river; they are much larger than further up, but are not obtained in such large numbers. On the Felton, the river passes through a well-cultivated district. From this village past Acklington and on to Warkworth, where the Coquet empties itself into the sea, the character of the surrounding country is much the same.

Plantations and Hedges.

THE MEDLAR AS AN ORNAMENTAL TREE.

of our smaller growing hardy de-
duous trees have been treated with
eserved neglect than the varieties of
Medlar (Mespilus Germanica), al-
carcely any surpass them in the rich
e of their foliage, or in the picturesque
what fantastic habits of their growth;
ir fruit-producing properties should
title them to at least a small share
ultural care which is so largely de-
apples and pears. Instead of which,
as if their claims to range among
s debarred them from having a place
ental grounds, while the unappre-
alities of their fruit led to their neglect
the garden and the orchard; so
are seldom to be met with even in
garden establishments, rarely to be
nurseries when wanted, and they
st entirely unknown in those subur-
other villa gardens which they are
ulated to adorn.

as the subject for special remarks
known variety called the large, or
edlar, which, as well as the others,
out a foot in height per annum for
twelve or fifteen years; and then
ore slowly till 20 to 25 feet high, by
much in diameter of head is attained,
ensions may be taken as represent-
ll growth; although old trees of 30
t in height are not unfrequent in the
vial vale of the Thames, and other
vourable localities. The habit of
even at middle size, is that of a
ue, broad-headed, rough barked,
r tortuous branched old tree, thickly
om April to November with exube-
ge, its softish entire leaves somewhat
g in size those of the sweet chestnut,
ckly interspersed in early summer
with solitary, white, wild-brier like flowers; and in autumn by the somewhat flattened, widely open-eyed, large persistent-calyxed, russety-brown fruit, which measure each from 1½ to 2½ inches in diameter.

As before mentioned, the variety to which the preceding remarks refer, is the large thornless Dutch Medlar, which, with the exception of a little-known sort called the monster-fruited, is the largest, the others being inferior to it in both their fruit and foliage; hence, it is that which should be most generally planted for ornament. The Nottingham Medlar, although having much smaller fruit, is preferred by many for its greater excellence. The stoneless Medlar, which differs in being nearly or entirely without the five small hard seeds, which are present in each fruit of the others, is preferred to them for preserving or cooking whole, but has nothing else to recommend it. The variegated-leaved Medlar is only a badly variegated variety of the first, and the wild or unimproved thorny Medlar is only deserving of being grown for plantation underwood, or as stocks upon which to graft the others. When used for the former purposes, and not too much overshaded, its showy flowers have a fine effect after those of the common hawthorn have passed away; and its fruit, like that of the wild crab apple, affords agreeable winter feeding for game and the larger kinds of singing-birds. The five first mentioned kinds are most easily perpetuated by grafting, and they all succeed as well upon the common hawthorn, as upon their own wild stock. Purchasers of plants should, however, guard against having anything to do with plants which have been wrought upon the pear stock —a not unfrequent practice in nurseries, although highly reprehensible, inasmuch, as although the plants do well for the first few years, they never form fine trees, and frequently die off in a few years after they have been planted.

Some of the large-fruited hawthorns are occasionally denominated Medlars. Thus the Cratægus Azarolus, the large edible fruit of which is much esteemed in southern Europe, is sometimes termed the Neapolitan or the Spanish Medlar, and the C. Aronia is not unfrequently named the Greek Medlar; but as used in Britain the name is only strictly applicable to the now small genus Mespilus, and the edible-fruited sorts above-named are all varieties of the M. Germanica, to which may be added the Japan Medlar—M. japonica—which is inferior to them both for use and ornament. Medlars are associated with quinces by many who have had little or no experience in the cultivation of either, in consequence of their fruit being in some instances used for like purposes; but the trees are much hardier, as well as more ornamental, and in most seasons they ripen fruit throughout Britain; whereas, that of the latter cannot be depended upon for maturing on standards north of the middle English counties. Medlars are among the few plants which thrive in smoky atmospheres, and that they are not largely grown in city parks and squares, may be consequent upon the too prevalent notion that nothing should be grown there which would tempt children or others to pull and eat; a notion which may be pardonable in the case of hurtful poisons of tempting appearance, such as the cherry-like berries of the deadly nightshade or those of the common Mezerion, but should never be allowed to interfere with the growing of whatever is ornamental, useful, and harmless.

When fully ripened the flesh of medlars is whitish, firm, and so chokingly astringent as to be unedible, but after being gathered they soon pass into a state of incipient decay or first-rottenness; when, before they become shrivelled or changed in outward form, they acquire a mellowed softness, combined with a peculiar but agreeable acidulated flavour, which is generally esteemed by those who manage to overcome the prevalent prejudice against eating anything which savours of rottenness. But, excellent as Medlar's are in this incipient state of decay for dessert purposes, they are still more valuable for making into conserves and preserves. Old English authors describe Medlars preserved with sugar or honey as being pleasant and delightful to the taste. They also ascribed to them certain useful medicinal properties, for which, however, they are no longer in repute. But in modern household economy, besides being stored or cooked in different ways, they are made into excellent sauces and jellies, the latter rivalling, but somewhat resembling, that of the best Indian guavas, and varying somewhat in flavour, according as to whether the fruit used in making them has been wholly in a hard or green state, or whether it has been either wholly or partly in that of incipient decay.

PRUNING AND THINNING FOREST TREES.

SIXTH ARTICLE.

[illegible] have made upon trenching, [illegible]ken o[illegible] n a general point of [illegible] without reference to particular cases. There are, however, cases where it will be of the greatest benefit; these are especially when it is desired to plant a crop of trees of the same kind on the same ground where other trees have just been growing. This—which is, when possible, to be avoided—may at times be necessary, and the planter has then to strive to supply to the new crop the same mineral ingredients of which the old one has just deprived it. This may be done by manuring, as we shall presently point out; or it may be done still better by trenching. The reader knows that many trees, as the different species of Pine, have roots which spread horizontally in the upper layers of the soil. Others, as the ash, oak, &c., send their roots vertically down. Each will most exhaust the layers of soil in which its roots are chiefly spread. Hence it is plain that it is better to plant a tree whose roots will spread deep after one which has exhausted the surface layers of soil, in preference to another surface-growing species, and *vice versa.* But if we are precluded from that, and are not permitted to plant trees whose roots will go to the least exhausted layers of the soil, we may bring these parts of the soil to the roots of the new plants instead. We must reverse the saying; and if Mahomet won't go to the mountain, we must bring the mountain to Mahomet. Our course is to trench; and if the trees with which we are dealing are surface-rooted, we must bring up from below the unexhausted soil which has not been reached by the previous crop; or if we are dealing with deep-rooted trees, we must bury the surface soil which has been least meddled with at the bottom, and bring up the exhausted stuff to the top.

3. *Ploughing.*—Another means of preparing the surface of the soil is ploughing it. This is strongly recommended by some, and it is unquestionable that it usually starts the plants well. Mr Brown's opinion is on the whole against it as ultimately prejudicial, although immediately beneficial in its effects. He cites a very remarkable instance falling under his own observation. He was struck in passing along the Lammermoor Hills in Berwickshire by a young plantation of larch and Scotch firs having a strange chequered appearance at a distance, which he found was due to five yards in breadth of the ground having been ploughed previous to the trees being planted, alternately with other five yards in breadth left unploughed. The plantation seemed about seven years old, and the trees on the ploughed land were double the size of those on the unploughed—viz., 5 feet instead of 2½. In the unploughed land, the Scotch firs were proportionally stronger than the larches, and gave a dark hue to the ground; whilst on the ploughed land the larches were by far the strongest, and gave a preponderating light hue to it, which was the cause of the chequered appearance which first attracted Mr Brown's attention. He therefore does not dispute that the immediate effect of ploughing the soil preparatory to planting is to cause the young plants to grow more rapidly. Indeed, he says, apropos to the instance above noticed, "it is the same in almost all cases of ploughing moorland for forest trees." "This," says he, "is occasioned by the decomposition of the grassy turf, and also by the roots of the plants having free and unchecked scope for the spread of their roots in search of food, which they cannot so readily do when the turf is of a close and compact nature, and in an undisturbed state." Notwithstanding this, his judgment is adverse to ploughing; but it is not wholly logical, for it is founded not on observation of the effect of a single ploughing preparatory to planting, but on the effect of planting trees in arable land. "I am aware that pine and fir trees planted and growing upon land which has been frequently ploughed previously, seldom live long or attain to any considerable size free from disease, which at once points out that nature wishes no interference of the kind."

Now, supposing all this to be correct, it is surely an illogical piece of reasoning to say that, because trees grown on arable land which has been long cultivated become thus inferior, the same result will follow on a totally different soil merely because it has got a single ploughing previous to putting in the plants. The inferiority obviously proceeded from the superior richness of the arable land pushing on the trees with undue rapidity.

We have not much personal experience on this point, however, and therefore do not venture to give a very decided opinion; but certainly Mr Brown's argument against ploughing previous to planting is nothing to the point, while the only instances he gives are strongly in its favour.

The Stable.

THE "GOODENOUGH" METHOD OF SHOEING HORSES.

THESE words stand at the head of a long article in *The Times* of December 10th, and which has been extensively copied into daily and weekly newspapers, representing all shades of opinion throughout the kingdom. It is from observing this wide diffusion of statements and laudations, liable, I believe, still further to mislead public opinion on a subject, about which the actual confusion is the most lamentable, that I feel it to be incumbent on me to submit some facts, and views of my own. *The Times* says—"Among the stir and bustle of an age of progress the art of shoeing horses may be said to have remained in its infancy, little noticed by the general public." The reverse of what is stated is the truth, and I will adduce words uttered long ago to help to refute the statement.

The late Professor Sewell said publicly, after his return from a second mission to the Continent more than fifty years ago, whither he had been sent by the governors of the London Veterinary College, that he encountered more lame horses whilst travelling from Harwich to London, than he had seen in his tours of investigation through France, Switzerland, and Germany; including his visits to veterinary colleges and other establishments to which sick and lame horses were taken. And I have heard him say, whilst repeating the above, that the best evidence that could be afforded that there was a total want of any system of horse-shoeing in Great Britain, was to be found in the fact, that every practitioner presumed to have a system or plan of his own; whereas on the Continent each nation is in possession of its method of shoeing based on old and well-tested experience, or each differing from the plan in neighbouring states only in details chiefly, according to the topographical condition of the respective countries, climate, stamp of horses, &c.

No people in the world have talked and written so much about horse-shoeing and its defective state as we have done, and at no former period so much as during the present century, and for the very obvious reason and consequence that in no other country or period were so many horses destroyed for the want of a rational and generally adopted method of shoeing and management of their feet. Far be it from me to insinuate that the art of horse-shoeing ever attained a satisfactory standard in this country, or has attained to perfection anywhere; but the question is one of relativeness in all its aspects. Earl Pembroke, writing a century ago, remarked that, "as feet differ, so should shoes; but as it happens, unfortunately for us, farriers belonging to the army, for want of proper education, due inspection, and encouragement, are void of all real skill and knowledge in their profession, and have minds, in short, quite uncultivated. I do not, however, despair of seeing in time some intelligent farriers properly instructed, and when such are formed, and not till then, the number of them in regiments should be increased. It would be even much better to have none at all till such a reformation is brought about."

Here we have it on the highest authority of an antecedent period to that previously referred to, that the defective state of the art of farriery was not only seen, but the causes were pointed out, and also the required measures for improvement; proper education, due instruction, and encouragement, were the requirements for making able horse-shoers, declared the noble Earl of Pembroke in his

760–70). And in what respect, I would
does the opinion arrived at, and
advice given by the guardians of
ction in England, in the present
differ from that just referred to. In-
ion was, and is still, the want. There
een too much talk, and too much writ-
f the wrong kind, but a want of action
work in earnest. Mr Goodenough is
luced in his new line of business
h appears to be that of ironmonger
horse-shoer combined, though the two
s are quite distinct), as the well-known
iate of Mr Rarey, whose display of the
r of mind over matter was so remarkable
bduing vicious horses. A lion tamer,
ot a horse educator, as his dupes dis-
ed, was his *forte*, but yet he succeeded in
g away thousands of pounds and his con-
d Cruiser; and no one hears of Rarey's
or Rarey's system except those who
d their valuable young horses by the
process. But returning to the "Good-
gh" announcement and laudation—for
are inseparably combined in the article
e me—I find the stereotyped paragraph
he properties and offices of the frog
squeezing) is attended to; *that*, of
e, ***in this age of progress*** is not to be
tten. We are next told that the process
full trial; and, therefore, as nothing said
will affect the issue, I will proceed to
under notice a few facts not generally
n about horse-shoeing, and purpose
g some remarks on Mr Goodenough's
fic notions.

ough the "infancy" of the art of horse-
ng cannot be profitably dilated upon,
our total want of knowledge about it,
as it regards our own country, still
ls may be chosen for starting points, and
ourse is not unfrequently taken to make
gative appear the positive state of the case.
his age of progress" has been the most
of any on record in the history of horse-
g for spurious schemes in this country.
, therefore, submit a list of the most
le, leaving out the minor, which have,
iously combined and indefinite ways,
raised into little systems.

Innovation No. 1.—About the end of the last century, Professor Coleman adopted "the tip" (an antient form of shoe, exceptionally used) as a shoe adapted for extensive use in England.

No. 2.—Mr Moorcroft conceived the plan, also about the end of last century, of making shoes by means of machinery in dies, after the manner of coining money, and he took as his pattern an English shoe many years before in use, called the seated shoe—a shoe with limited surface for the hoof to repose upon, and an extensive bearing surface towards the ground.

No. 3 was a mode of shoeing conceived by Professor Coleman, with the lower or ground surface of the shoe made concave, the author using the ready means provided by a rival for illustrating his opposition scheme, by describing it as Mr Moorcroft's shoe "turned upside down."

No. 4.—At the beginning of this century, Mr Coleman's plain bar shoe, turned up at the heel to give pressure to the frog.

No. 5.—Coleman's frog-bar shoe, patented.

No. 6.—Coleman's split-bar shoe, patented.

No. 7.—Coleman's oblique-bar shoe, patented.

No. 8 (1809).—Mr Bracey Clark's jointed shoe.

No. 9 (1820).—Mr Joseph Goodwin's improvement on French shoeing, consisting of turned-up toe, concave lower surface, &c.

No. 10 (about 1839).—Rodway's patent shoe.

No, 11.—Mr James Turner's one-side nailing system.

No. 12 was a new mode, extemporized and patented four or five years ago by a London practitioner, consisting of a narrow thick rim of iron, with the everlasting, concave ground surface.

No. 13 comes from France, in the past year, under the designation of the Charlier system, which, to ourselves, looks like an old acquaintance in a new dress, thereby the plan being made a little more complicated, and to that extent the more absurd.

No. 14 is the "Goodenough" plan under consideration, and on trial.

In the above enumeration I may, inadvertently, have omitted some inventions, but the above will suffice for my purpose. We may repeat the old adage, "they have managed these things better in France."

"Nimrod" wrote about thirty years ago, while sojourning in France, lamenting the excessive prevalence of lameness of horses in England to what he found to be the case on the Continent, surmising that "shoeing was always looked upon as a simple question until Coleman came with his crotchets and put us on a wrong scent."

But this is inferring too much, with too little evidence, still we have these significant words of an experienced horseman. Coleman, with his total want of knowledge of this subject, of which he assumed so much, gave out the proposition that "*all shoeing is a necessary* evil;" hence the preference of the *tip*, because it was the least like shoeing of any. Put the first of these phrases properly however, and it is like saying that all wearing apparel and the science of architecture are necessary evils, because the first may impede the action of our limbs, and houses may fall down upon us; relatively the evils of shoeing consist in the bad execution of the work.

Well understood and diligently done, shoeing is capable of conferring more direct good than any other procedure in the art of horse management—that of supplying them with food excepted.

But I am digressing from my subject; the merits of the "Goodenough" method of shoeing horses, as it is announced and expatiated on in the long article before me, every sentence of which deserves more notice than I can devote to it. The "Goodenough" shoes are represented to possess a great advantage over other shoes by being light, and the public is enlightened by measurements and weights represented by numbers, which, of course, the generality of readers regard as exact; for this reason I think it right to make such remarks as may be relevant on the matter.

The writer states that at omnibus pace, a horse lifts each hoof 6 inches, and takes with all four about sixty steps a minute. "A set of 'Goodenough' shoes would, therefore, save this particular horse every run the labour required to lift a ton weight to the height of one foot." In order to diminish the chances of error on my part, I have referred to my notes of experiments and observations, made some years ago, to settle certain laws in the action of the horse, and find that my own data differs not a little from those above given. A horse trotting at the rate of 8 miles an hour, average omnibus pace, takes sixty steps in going over 45 yards distance, and the time employed is twelve seconds. Now, if the horse occupied one minute in taking sixty steps, the time he would require to go over 1 mile, or 1760 yards, requiring 2400 steps, would be thirty-nine minutes, and to do 8 miles would require five hours and twelve seconds—*i.e.*, five times as long as is actually the case. The next proposition, it appears to me, could not have been intended to be comprehended by the individual reader, for the very good reason that the *ease* with which a certain measure of mechanical work can be done by a horse cannot be ascertained and expressed, and upon the ease depends, to an enormous extent, the absolute amount of mechanical work which the animal can achieve. I admit that we may, by a knowledge of the action and power of the animal, together with some knowledge of mechanics, estimate to a certain extent what may be the effect of a given weight carried by a horse on his back or attached to his feet; but still trial is the essential test, and until this is applied, these can only be said to have furnished grounds for more or less successful guessing.

There is a common saying among horsemen in reference to the weight of shoes—viz., that an ounce of iron nailed to a horse's foot is more burdensome than a pound placed on its back, it being sometimes alleged that weight at the extremity of the limb acts as if placed at the end of a steel-yard. I, on the contrary, regard the following to be nearer the state of the matter:—

1st. Each foot is as long on the ground as it is in being moved by the body through the air, and while reposing or acting on the ground, the shoe does not count as weight borne, but as affording staying support on whatever surface the horse moves.

2d. The foot is neither raised nor carried through the air solely by the force of the limb to which it belongs, which limb (including the foot) is undergoing the least conceivable exertion from the time the body passes over it, when it is flexed, raised, and extended, to alight again when its turn for exertion comes round. In other words, it is whilst the foot is moving on the ground that the limb is doing the greatest amount of mechanical work. What are, then, the essential conditions for the easy raising of each foot in succession, for flexing and carrying it at its right height above the ground, and to a given distance before it alights? Why, that all the other three limbs should be acting their part with perfect ease; that the conditions of the feet and the formation of the shoes should be such as to give the most perfect bearing and hold for the limb to act on. Now, will the "Goodenough" shoeing fulfil these conditions? I cannot see it. Shoes alone form, it is true, but a small part of horse-shoeing; these may be good, and the whole result may be very bad; but if the first are bad, the whole cannot be good. The "Goodenough" system, as it is explained by the *Times* reviewer, is based upon all the erroneous notions which have over and over again been the basis of plans of shoeing at first puffed up as admirable, but afterwards discarded as more pernicious than those they were intended to supersede.

We confess that it is not from America that we should expect a model system of horse-shoeing. Next to our own country, America stands most in need of such a system.

It would appear that the best prevalent rules of the art of farriery are as antient as bits and bridles, and, with slight modifications, are in vogue all over the east—from the shores of Algiers to Egypt and Arabia. These rules were conceived with wisdom, and carried out with surprising correctness.

Modelling the shoe to suit the motion, as well as the form of the horse's foot, was early, and is still adopted in southern Europe. The shoes for the desert were the best, and will probably never be superseded for giving stay to the horse's feet on the shifting sands and very loose soil of those counties; but the Europeans, chiefly the Italians, the Spaniards, and the French, brought out systems equally well adapted for different soils and different requirements. Even England, whilst she was importing the best stallions and mares that could be found for the purpose of improving her breeds of horses, brought some farriers also from Italy. Some of our old writers mention their Italian masters—Blunderville in particular — and adopts their vocabulary—*i.e.*, farrier or ferrier, from Ferro, iron. But though Henry VIII. and other English princes brought over continental farriers as well as riding-masters, there was not leaven enough to leaven the whole lump. British soil and climate produces the best horses in the world; but an art, such as horse-shoeing is pre-eminently techinical in its bearing, required carefulcultivation, such as it received in France, and some other continenta lcountries. I believe that if the history of horse-shoeing is looked into as far as the literature and traditions can inform us, that, taking all times and countries, such a series of bounds from one train of erroneous practice to another, as are shewn in the numerous systems taken up in England in the present century, will not be found, and, allowing that one or two of them were of foreign origin and elaboration, it is still true that it is only in England that notice has been taken of them.

Amongst the principles claimed for the "Goodenough" shoes—and I will only mention one—is that which originated with Coleman, and which still runs through English practice extensively, forming a chief feature in several of the systems which I have enumerated —viz., the concave ground surface—Moorcroft's shoe turned up side down. There is no country or soil where that mode of shoeing must not of necessity prove injurious. It affords the minimum of bearing points on the ground surface, with thorough exposure of those parts of the foot requiring defence; hence results great derangement of the functions of the foot, and by this combination the maximum of jar and injury. A horse shod on any plan involving the physical disadvantages here contemplated, must, when under exertion, and when compared with one properly shod, be in the same position as two rowers would be who were compelled to row a boat with pitchforks instead of oars.

On yielding ground, whether wet or dry, clay or sand, this reversed form of shoe admits of no fixity or stay for the horse to exert his powers on; the foot constantly sinks or shifts.

In conclusion, I may not inaptly quote a few words from an able horseman and author of the last century. "Happy, indeed, would it be for the art, if artists only were its judges, and people meddled with nothing but such things as they are qualified to understand; but, unfortunately for the present subject, among others, it is not so."

THE HISTORY OF NEWMINSTER'S CASE.

BY JOSEPH GAMGEE, SENR.

AFTER I had been informed that "the nasty ugly toe-end of the near fore-foot of Newminster had been got rid of," and that the other one was threatened to be dealt with in the same way, I understood that another, and most probably a final crisis would happen at no long distance of time. There then seemed little chance of the horse passing through the season without relapsing into the state from which he had shortly before been retrieved; though whilst under my treatment I had exposed not only all I did in the case, but my views on the horse's malady so far as I could communicate them. I had no secrets to keep about the case, and every reasonable question asked me was answered; but the best answer of all was the direct relief given, and the horse's progressive and rapid improvement from the first to the last day during the period over which my control of the case lasted. But that step in the dark which led to putting in motion the strong arm of the "blacksmith," to wield a weapon of destruction, warned me that all improvement was arrested, and that deterioration was about o set in anew. When I saw the reports in he London sporting newspapers for August, on the tolerably satisfactory state of the grand-sire, I could not dismiss from my mind he belief that the reporter must have been misinformed with regard to the real state of the horse. I therefore determined that, since a statement had gone forth, the case should be drawn out to serve its legitimate end—instruction; and I had recourse to my notes for the details, to amplify which I wrote on August 25th, 1868, to Mr John Scott, putting to him the following queries:—"1. At what age did Newminster begin to shew signs of pain in his fore feet? 2. How long was he kept in training after he won the St Leger?"

These queries were answered in the following note from Mr Scott:—"White Wall House, Malton, August 26, 1868.—1. Newminster when in training was never wrong on his feet. 2. Newminster ran several times after he won the St Leger, and until he was six years old, when in 1854 he ran for the Chester Cup, which he would have won, indeed had won, but broke down a short distance from home, and that was his last race. He left us in October 1854 for the stud at Tickhill." Contrary, therefore, to the statement made to me at Rawcliffe, Newminster was a sound animal during his brilliant turf career—in particular when he appeared on the Doncaster course at three years old (for guidance we may say at three years and eight months old). That he was a horse of good stamina, his somewhat excitable temperament under work notwithstanding, is evident from the

of time he was kept in training—from
six years old inclusive. He began his
areer at seven years old, at a subscrip-
ten guineas each mare, which in the
eason, when he stood at Rawcliffe, was
to fifteen guineas. One of his first
's produce, Musjid, winning the Derby,
is stock generally proving good, New-
er's fee was augmented in succeeding
ns until it reached fifty, and, latterly, one
ed guineas a mare, at which price more
riptions were applied for than could be
each season.

t ere the highest fee was charged the
's power had declined. His con-
ion was sound, but he was under-
d by local affection in his feet;
ding ulceration of the pedal bones of
fore feet was going on, which bones,
ey may be seen now, if they are properly
ed and exhibited, will be found to be
ed to little more than half their length
depth, with destruction of all their arch
To make these statements, and
the past is easy, but to consider
complications and agony caused to
orse is impossible. Under such con-
s little advantage could be taken of the
renown to which the horse had attained.
ninster was 19 years old when I was
ng him—but his sire, Touchstone, lived
, and his dam's sire, Dr Syntax, to 27
; and being sound all over, except his feet,
their condition fast improving, there
easonable ground for hoping and believ-
hat the best descendant of both the
world-famed horses might be preserved
hem to a good old age. As it happened,
ewminster's death having been brought
t, and his career shortened at the time
it was most valuable, something ap-
hing half the possible revenue that
t have been obtained for his services,
es loss to amateur breeders and the
g world, was forfeited. During the
en seasons he had been at the stud,
e I attended him up to the 19th year of
ge inclusive, the aggregate of his annual
would not have produced much more
might have been realized by other six
seasons, which would have included the period from the 20th to the 25th year of his age, and might possibly, at 100 guinea fees, have produced during that short time from fifteen to eighteen. thousand guineas. Under these circumstances the sentence addressed to me seemed incomprehensible—that "he was not worth spending any more money about." Surely, apart from feelings of humanity and sentimentalism, if ever there was a case of a horse in which it was advisable to follow the fisherman's tact—to throw a small fish to catch a large one—this was the case.

In conclusion, whilst I have unreservedly expressed myself on this case, and stated by words and implication that Newminster's life was rendered horrible, and shortened in duration by local disease, a knowledge of which—of its cause, modes of prevention, and cure—might have preserved the horse, I in no degree impute personal blame to any one; every one, I presume, acted to the best of his knowledge, therefore all I maintain is, that knowledge on the matter was the very thing wanted, and therefore it must follow that no one was responsible for more than he possessed. As I have already stated, Newminster's case was in no other respect extraordinary than in degree. Thousands of horses are now suffering in this country from affections like his in kind, which, as his was, are curable and might have been prevented, only to the inevitable extent due to the limitation and imperfection of human appliances.

Looking back at my professional career, I believe that during the first fifteen years I was in practice such a case as that of Newminster might have happened, and have run its course of destruction under my care. During the second fifteen I should have prevented, but not seen my way to restore a horse in such a state to ease and usefulness; and looking to the third period of fifteen years of my practice, I must come down to the latter part before I could marshal all the means I have now developed to manage such a case. The doctrines promulgated at our English Veterinary College, on the conditions of the horse's foot, natural and diseased, and its management and shoeing, from the period of the foundation of the school, were such that no man who became a disciple to the teaching, and most of the best students and workers did, could enter upon the practice of that department of his art successfully. To free one's self from the trammels of erroneous teaching is no easy process, and one in which few succeed. I for one became deeply embued with the errors, and, great labour and sacrifices notwithstanding, only cast them off by degrees when I found that all had been wrong.

Though Newminster's case must he looked upon as an unfortunate one, the worst feature is, that it represents one of the great miseries of the age, and a state of things which distinguishes our country amongst the nations of Europe for the apathy and neglect shewn in the management of horses' feet.

ROUGH LEAVES FROM THE NOTE-BOOK OF A VETERINARY SURGEON.

NO. I.

DISEASES OF THE DIGESTIVE ORGANS.

IN commencing my rough notes, I propose taking up the *diseases of the digestive organs* in cattle; and, in doing so, I will endeavour as simply as possible to describe the changes the food undergoes in the stomachs, or, in other words, the process of digestion. I need not allude to the manner in which the animal either partakes of its natural or artificial food, an act so well known to all connected with cattle, &c. The food, in the first instance, is but partially masticated before it reaches the rumen or first stomach, where the contents undergo a process of maceration, or fermentation and trituration, by the muscular action of the stomach, causing a rotatory motion of the contents, or, as it is called, the peristaltic motion, so as to fit or prepare the food for remastication, or, as it is called, the act of rumination, or, speaking more homely, chewing the cud. To give an anatomical description how it is brought about, by the various construction and action of the parts, would go beyond our limits, and I think not of much advantage to the owners of cattle. When the rumen is filled, the animal ceases to graze or eat, and will then lie down on the off or right side, or, it may be, in a standing position, and hen commence to ruminate, which process it is pleasant to watch. Each pellet ascends, not direct from the rumen, but through an opening it to the reticulum or second stomach, or water ouch, and descends, not again to the rumen, but to the reticulum or second stomach, to be lubricated and well moistened with the liquid and juices there contained, before its entry into the maniplies or third stomach, where again the food undergoes trituration, or, I may say, mastication, between the very numerous leaves contained in it, grinding it down into a soft pultaceous mass, before its entry into the abomasum or fourth or true stomach, where the digestion commences. The food, being mixed with the gastric juice secreted in this stomach, when properly dissolved or cooked, passes into the small intestines, and is there mixed or acted upon with other juices from the liver, &c. It is thereafter converted into what is called chyme, which is then taken up by small vessels called lacteals, to be carried through the system to the heart, to be converted into blood. The residduum or excrementitious portions is passed along to be evacuated per rectum, or at its termination, the anus.

We will now proceed to the diseases of the foresaid organs, commencing with ***the mouth***, as it may be termed part and parcel of the digestive organs. The teeth of cattle are but seldom diseased, or require the use of the tooth-rasp, no doubt owing to the food being of a soft nature; but at times we meet with cases of inability of mastication, slavering at the mouth, refusing to eat; at the same time the evacuations are regular, pulse and respiration in no way disturbed, horns and skin cool, and, with the exception that the mouth cannot be fully closed, the tongue partly hanging out, with a profuse disof saliva, the animal seems otherwise y. But if the mouth, with the aid of the -iron, is closely examined with the hand, ay find, sticking between the teeth, per- a piece of nail, wood, bone, or some substance, causing all this irritation, hen removed all is soon well. At the time, a dose of physic will be beneficial, irritation may have caused some slight ance in the digestive apparatus, especially maniplies, which stomach so greatly thises with all diseases incidental to cattle. ases are very often mistaken for apthæ— rush, blain, &c., as the tongue, cheeks, ay be injured by the same substance. the great necessity of thoroughly examin- e mouth, teeth, and tongue in all cases giving your prognosis as to the nature of ease, or in commencing any inward treat- where the pulse-respiration and other oms of fever are absent.

hæ or Thrush, a disease of the mouth ing mostly in the spring and fall of the n fact at all times and seasons, especi- cold easterly winds with much wet. It s in small whitish pustules all round the and on the tongue, and will sometimes to the outside of the lips. There is mes considerable fever, with alternate ness and looseness, pulse quickened, tion a little hurried, and may at times as an idiopathic affection, but it is ymptomatic, and that with the diges- gans, or, in other words, the stomach owels: that with the state of the r causing it. Calves are very subject hæ; and when such is the case you pend that the mother or foster-mother's as something to do with it. At least, called to attend calves with thrush, I d my attention more to the state of the , in the first instance; and, although nay be no appearance of thrush in the of the latter, you will find that the re organs are at fault. By examining es, they will be found not thoroughly ed or digested, and, if I may so term the pure smell of healthy fæces; the will feel hot and clammy; the appetite ot be lessened, or may not be observed east affected; same with the pulse and ion, but the state of the fæces will be seen and understood. A dose or two of perient physic allowing an interval of r four days to elapse between the first and second dose, is urgently required, with a change of food, such as sloppy bran mashes mixed in some hay chaff, also boiled turnips, barley, clover chaff, chilled water; the animal to be comfortably sheltered, but not kept too warm. The calf will also require a dose or two of physic, even should there be looseness or diarrhœa, substituting for the milk of the mother boiled linseed, thickened with oatmeal gruel, or milk from another cow, until such time as the mother seems all right and the physic worked off. The mouth may be washed with a solution of alum, say one ounce of powdered alum to a pint of water. Wrap some tow on the blunt point of a stick, soak in the solution, and well rub backwards and all round the mouth, under and above the tongue. Adults will also require the same treatment to the mouth; but the principal treatment is to get the bowels and stomach in proper working order by physic, change of diet, and comfortable housing.

Choking, or obstructions in the gullet, is the most frequent incident in this organ, and the obstructions oftenest met with are potatoes, carrots, turnips, chaff, &c. In the two former it is frequently caused by placing them whole before animals, and by their not properly masticating them. A large portion, or one alone, is sometimes swallowed, and gets fixed, generally a short way down the gullet, and can be seen and felt; at other times, it may be lodged in that part of the gullet within the thorax or chest. In the former, when within reach, we have often removed it with the hand, which is done by using the common horse balling-iron, and gently inserting the hand by a half rotatory motion, keeping the fingers as straight as possible, but well puckered together, with the thumb under them, until the substance is felt, then open the fingers wide, and grasp it; but it is not such an easy matter to pull it up when you have hold of it; the muscular coat of the œsophagus is very powerful, and, what adds to it, the animal is all the time using its action contrary to your efforts; but by patience and perseverance you will succeed. Or, by horning down some oil or melted lard, and placing a hand on each side, and rubbing upwards and downwards, you may safely dislodge it. When these means fail, recourse must be had to the probang, using the cup end, and gently but firmly push it downwards till it has passed into the rumen which will be known by the hoven, which is always present, subsiding directly that is accomplished.

I remember a case of schirrus, near to the carniac orifice or lower part of the gullet, terminating at the stomach, in which the animal, after eating grass or hay or chaff, would suddenly become hoven, and vomit, if I may so say, "all up." I tried the probang different times, but all was of no avail; in fact, I could not exactly say what was the cause, but as the patient did pretty well on sloppy mashes, boiled pulpy food, and, being also in calf, she was kept till parturition had taken place, but as she could not after that be got fat, and keeping always in poor condition, was destroyed, when the cause was soon seen. Of course no treatment was of any use there, had I known or judged the cause. We never had occasion to cut into the gullet, and as that operation must be left to the veterinarian I need not refer to it here. When the gullet is lacerated by using cart-whips or ropes, as is sometimes done, and even by the probang (but in skilled and careful hands such an injury should never happen with the latter), the sooner the poor animal is destroyed the better.

We will now proceed to the diseases of the *Rumen*, commencing with hoove, hoven, fog-sickness, &c., or distension of the rumen from an accumulation of gas, the causes of which are various. We will enumerate those oftenest met with. Cattle confined to the shed all night, and in the morning turned into a field of ryegrass and clover (perhaps wet with dew), in a short time will be found highly tympanic; eating greedily the moistened grass without chewing it, merely rolling it in a lump and swallowing it, they do not allow time for it to become saturated with the saliva in the mouth, which is a necessary adjunct to digestion. A small quantity, especially if the grass is in seed, eaten in this manner, seems to paralyse or stop the peristaltic or regular motion of the stomach; hence fermentation speedily takes place, and then the evolution of ga [illegible] not quickly checked, soon increases [illegible] ful extent. Grains [illegible] abbage, especially if [illegible] me is another very [illegible] any sudden [illegible] use. Animals [illegible] of a morning [illegible] st is on the grass, before [illegible] have time to graze, are [illegible] atta[illegible] ith hoove or tympanitis, and [illegible] this latter cause the abomasum or fourth stomach and intestines seem often to be affected from spasms, or from colicky pains being present, the animal pawing and stamping with the fore feet, lifting the hind legs sharp up to the belly, moaning or half shrieking with pain, vapour or steam from the perspiration rising from the whole body. Stall-fed animals, either for fattening or the dairy, are often subject to hoove from the changes in feeding they are subjected to, to hasten the fattening or increase the supply of milk and make it richer. Now, if owners of cattle would bear in mind how prone the animal economy is to derangement, when undergoing a sudden change from poor to rich feeding, or from being kept up in the winter months and fed on dry food, and then turned out, or perhaps, during the winter, half starved, and, when turned out, grazing eagerly on old rank grass, &c. There is nothing more conducive to disease of the digestive organs than these changes, hence the necessity for being prepared by giving a mild dose of physic—first preparing the animal by boiled food or mashes, and in the course of a few weeks giving another dose of physic. We know well that farmers in general consider these matters too troublesome, and never think how much more kindly an animal will fatten; or cause more secretion of milk, and save them many heavy losses when the trouble is taken. When looking over the stock on a farm I have often remarked that when a cow did not seem to look so well, her coat unthrifty, did not feel kindly, and droppings not healthy, I would advise a mash or two and a dose of physic, but would be met with the reply, "Oh, she eats and drinks, and, for what I know, milks as usual; besides, the physic would stop her milk." Only for a meal or two, but then look at the increase after, besides the prevention of serious disease. Then, perhaps, the cowman is applied to: "Well, she has not milked so well the last day or two, but I see nothing much the matter;' so there the matter rests till a few weeks after she is found neither eating, ruminating, or dunging. Such is so much the way with them, that "sufficient to the day is the evil thereof." A little trouble and small expense at the right time would save them many pounds in the course of a year. This digression may be useful if attended to.

NO. II.—HOOVE.

We now proceed to the *symptoms of hoove*. The most prominent is considered to be swelling, and that principally on the left or near side. The animal stands with the legs drawn under the body, will scarcely move, keeps its head out, grunting or moaning, breathing th profuse discharge of saliva, its tongue out, eyes prominent and staring, wild l if of long continuance the conjunctiva inflamed or blood-shot, pulse hard, and, nimal is not soon relieved, death soon lace. The treatment of hoove in its stage, and if the stomach is not lled with food, is a simple affair, and ng a good dose of black pepper and n half a bottle of gin, brandy, whisky, or ping the animal on the move pretty he swelling will soon go away; however, e animal cannot be got to move, and e seems to have no effect, you may try ang, which, in some cases, will relieve panum or allow of the escape of gas; s only for a while or temporarily, as forms again. Medicine must there- given to neutralize the gas, and, if pains are present, the following:— oil 1 pint, turpentine 4 to 8 ounces, nd slowly horned down, or, what is dministered by a long-necked tin or glass carbonate of ammonia, 1 to 2 ounces n a pint of cold water; 2 to 4 ounces mmonia or spirits of hartshorn in the antity of water, or the aromatic spirit of a, 2 to 4 ounces in a pint and a-half or ter. Now, if inflammation is present, and oon takes place less or more, one would e highly stimulating medicines if allying would increase the other. However, r had any hesitation in giving the largest nd to counteract any tendency or in- f the inflammatory symptoms we always gely, and when all swelling had gone, strong dose of physic, repeating it in doses every eight hours or so, till the were perfectly opened, allowing only of boiled food, bran mashes, &c., for ays. Now, it may happen that none bove remedies are at hand, or can be got, and the farmer or shepherd t have a trochar or canula, and, in f emergency, resource must be had to ng; that is, making an opening in the and allow the gas to escape that way, s easily and readily done with a sharp e, in the absence of a trochar and canula. per place for puncturing is on the left ou place your thumb on the side of the so that the fingers will reach or span e last rib to the lateral processes of the vertebra, or projections from the back-bone to spine of the ilium, or projection of the haunch-bone, then at the point where the thumb rests puncture. Now, when the operation is performed with the trochar and canula, the affair is simple, and the canula may be allowed to stop for some days tied round the body with tape or twine. When gas is no longer discharged withdraw the canula, and the wound will soon heal, or you may place a pitch plaster over the opening; at the same time, after the distention is relieved, give as speedily as possible a dose of physic as before. Now, when the opening is made with a knife, the frothy mucus or some of the contents may escape into the cavity of the abdomen, setting up peritoneal inflammation, and we should advise bleeding largely to prevent any untoward results; but, I may add, however simple the operation, and however scientifically performed, there is always danger less or more to be guarded against.

Distention of the rumen from overfilling with food (which is readily known from that of gas by the pressure of the hand as if on a solid mass—the former as if pressing the hand on a bladder filled with wind), is a far more formidable matter than hoove. What, with the over-accumulation of food, the fermentation and evolution of gas going on, medicine is of no avail; recourse must be had to some other means of relief, and that is by enlarging the opening made for paunching, as before described, so as to allow the hand to be introduced and remove the contents by handfuls. Great care is required to prevent any of the contents escaping into the abdominal cavity, which is best done by first making an opening large enough for the two fore-fingers of the left hand being introduced, and by them keeping the stomach close to the peritoneum and fleshy wall of the abdomen, and then so enlarging the opening, after sufficient is removed as will allow the introduction of a towel, one end hanging outwards on the skin, the other inside and close to the stomach; you can then empty as you like. We have generally kept the cloth in this position for some days, or until at least the physic had commenced operating. After removal of the cloth, carefully clean the parts with a damp cloth, then draw the outward or external wound together with a few stitches, or apply the pitch plaster—the former is the quickest in healing. We have never drawn the edges of the stomach together with sutures of any kind, nor seen any bad results from not doing so. The animal must be carefully fed, and have occasional doses of physic given for some time after, slowly and gradually fed and then consigned to the butcher. The probang and stomach-pump in such cases are of no use whatever. Their use looks well on paper in theory—the practice, as I say, is simply impossible. Again, some writers say that bleeding in such cases is not necessary. From an extensive and long practice, I am convinced that such advice is quite erroneous, in fact betrays actual practical ignorance; for instance, few animals are slaughtered whose lungs are free from chronic disease, less or more, and in such cases one must know how the action of the lungs is impeded by the pressure of such a large organ as the rumen. Again, is there no sympathy of the omasum or maniplies with every affection cattle are liable to? As I have said before, you must take every precaution to guard against inflammation taking place in any organ wherever situated. Where such excitement is caused to the whole system in such cases, concretions are apt to accumulate in this stomach, such as hair balls, from the habit of licking one another, from swallowing indigestible substances, interfering with the action of this stomach. I have had cases in which every time the animals were fed, hoove took place more or less; in fact, I may say, they were hardly free from hoove in a slight degree, which I attributed to some of the above causes. Occasional doses of physic, feeding oftener and less at a time, and not allowing to graze too long, were the remedies adopted. In reference to my remarks on "choking" it is necessary to state that the mouth of the animal should be kept distended during the operation by a piece of wood, to prevent the distention of the rumen from gas till the obstruction is removed.

The Dairy and Poultry Yard.

THE HENWIFE'S KALENDAR FOR FEBRUARY.

HEN it is ascertained that the hen is really brooding, let her be put into a dry, warm place; put her nest on the l, make it just the size that the hen can rly flat at bottom, and sufficiently wide eggs to be placed side by side without on each other, otherwise the hen is break them in the process of turning. a damp turf in the bottom, line it thickly lean dry straw cut in pieces. The ad- e of the damp turf is, that it prevents erish heat which a thoroughly dry nest s, and which weakens the chicks so as frequently to render them unable to the shell; and we know that when a ts herself, it is always in a hedge or the roots of trees where the damp grass foundation of her nest. How strong althy such broods are we all know; so would have nature's success, we must her procedure as far as we can. When uld not be had, we have found damp earth answer very well. Breaking the pieces prevents the chipping of the eggs incubation, and is also much safer for ckens than the long straws which re apt entangled in the feet, wings, and neck, t unfrequently cause their death. Sitting of wood have been said to be uniformly rm, close, and dry, to produce healthy ns, and wickerwork baskets with wooden ns have been recommended. We have ubt such baskets are excellent when n be had, but, for our own part, we ied every way, and find nothing better . nest literally on the ground, and put ape by means of a few large stones, of wood, or anything that comes to With a knowledge of the principles on which to work, a very little ingenuity will make simple materials go a great way. As we before said, the hen must be put into a quiet place; she does not like noise while hatching, and if disturbed is apt to leave her eggs, or to break them by the sudden movements which terror causes. When any of the eggs are broken the shell should be removed, and the others carefully wiped with a damp cloth; if the egg is left on the shell, when dry it forms such a thick coating that the chick cannot penetrate it, and so perishes in its dismal prison. Hens have been accused of eating their eggs; the probability is that they only do so when the eggs are broken, hence the necessity for taking care and endeavouring to keep them entire. If there is a house specially devoted to sitting, the hens must be separated and placed at some little distance from each other, that they may not steal the eggs which do not belong to them; this they are sure to do if close to each other. We have seen one covetous hen appropriate to herself nearly double her own share: how she conveyed them all in safety was marvellous, but certainly she did so; how, we have never been able to discover. Had she not speedily been deprived of her ill-gotten gains, she would, in all probability, have failed in bringing out a single chicken. After the hens are fed, it is well to see that each resumes its own nest, as they often covet those of their neighbour. The larger, the whiter, the more numerous the eggs, the more does the hen desire that nest, whether it belongs to her or no; hence the necessity for care and watchfulness. Where fowls are kept on a large scale, a sitting-house is as indispensable as a hen-house; but where only a few are kept, and accommodation is deficient, ingenuity must supply the defect. Any out-house that can be spared may be made use of; an unoccupied pig-stye, a barrel laid on its side, and well filled with the materials we have mentioned—any or all of these may do, provided always that the occupants be sheltered from wind and rain, and protected from the intruston of their enemies, whether bipeds or quadrupeds. We have ever seen a hen set in a "press" or cupboard by the side of a kitchen fire; the sagacious creature scratched the door when she wanted food. The warmth of this position contributed to bring out large and early broods.

Wherever the hen is set she must have food once a day, and a copious supply of clean fresh water; she must also have access to a heap of earth, sand, or small gravel, to dust her feathers. She must not be off her nest more than half-an-hour; generally she returns to it spontaneously, but should this not be the case, she must be gently driven on. Soft food, such as has been described above, has been recommended; and we have no doubt it is excellent, provided dry grain be given in addition. Oats we have always found to be the greatest favourite with our hens, and upon this alone we have frequently fed our sitting hens, and found it suit.

The Naturalist.

A NINE-TUSKED ELEPHANT.

R ANDREW MURRAY, the eminent naturalist, in reviewing "Chapman's ls in South Africa," in the "Journal of l and Natural History"* notices specially iscovery of a nine-tusked elephant near mbesi, which is thus described by Mr nan :—

he elephant killed by Molefi, otherwise Rapiet, six years ago on the Teouge, vhich attracted notice from the singu- of its having no less than nine perfect was, he told me, a male. The tusks ranged five on one side and four on the I purchased some of the tusks at the but they had been mixed up with many , and, when I heard of the peculiarity, ould not be identified. I got Molefi to be the affair over again, and Baines a sketch from his description."—(Vol. 98).

s certainly does not tell much regarding markable abnormality; and Mr Mur- cordingly set to work to obtain further ation, Recollecting that Mr Baines, now resident in London, accompanied apman on the journey referred to, he d to him for particulars, to which Mr at once responded. Mr Baines had usly described this elephant in his work, lorations in South Africa," in the follow- ragraph :—

ne of the most wonderful freaks of I have heard of, is an elephant with sks, shot about the year 1856 by this It had on the right side five, and on t four, all growing as usual out of the jaw. The pair occupying the usual were of about thirty pounds weight just behind them were a pair somewhat larger, pointing downward and backward; between these was another smaller pair, and before and behind them in the right jaw were two others, but in the left only one behind, all these being much smaller. I made two sketches, one of each side in his presence; and there is no doubt of the fact, as Mr Edwards, the partner of Chapman, bought six of the tusks; the head unfortunately was broken up."—(P. 454.)

From Mr Baines, Mr Murray obtained some interesting particulars of this animal, which we now place before our readers. Mr Murray says that Mr Baines "not only most liberally placed his sketches of the nine-tusked elephant in our hands, with permission to use them, but has also had the kindness to make drawings from them for the accompanying woodcuts, the two first being taken from the original sketches, and the third, with the mouth open, an imaginary sketch made at our request to show our idea of the real position of the teeth, and which he has been willing to execute notwithstanding that it is opposed to his own convictions on the subject."

Mr Murray continues :—"The elephant in question was, as above mentioned, shot by a Bechuana named Mahura or Rapiet (that is, the father of Peter, it being it seems the custom in that country to call the parent after his first-born son), and both Chapman and Baines consider his testimony on this point honest and reliable—a conclusion in which the anatomists who have seen the sketches concur, from the intrinsic evidence of the apparent position assigned to the abnormal teeth. Although Baines and Chapman did not see Rapiet until some six years after he had shot the elephant, the subject had surprised himself so much, and attracted so much

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n : Williams & Norgate, vol. i., pp. 220, 265.

attention in the country, that it remained fresh in his recollection. Mr Baines made a drawing of the head and tusks in his presence, and took great care to place them according to his account of their actual position. Rapiet gave him no reason to imagine that any of them grew anywhere but in the upper jaw, and Mr Baines tells us that he is quite sure that if either of them had grown from the lower jaw he would have told him of it. Mr Baines consequently supposes that they all grew as usual from the socket of the tusk above the upper jaw. We think, for reasons to be presently mentioned, that he must be wrong in this, as he certainly is in an analogy which he suggests, and which we only note, that it may not be said that we have kept back anything relating to such an interesting case. He says:—

"'I do not profess to account for it, but if I mention that the Kak tribes, by splitting the horns of the young calves, cause them to grow into any number of branches, as the animal attains maturity, it may be suggestive to those who wish to investigate such cases. I have seen many instances of deformed, distorted, or broken tusks, the fractured parts of which were overgrown with nodules or excrescences of ivory.'

Mr Baines has also shewn us a sketch from a dead elephant, in which one of the tusks is turned up in the ordinary way, and the other turned down like the two additional large ones in this mammal. This is all that we know, or are ever likely to know, regarding this extraordinary case, and it was a most fortunate chance that sent Mr Baines to the spot to take the sketches from the description of the man who saw it killed [illegible] [illegible].

[illegible] S[illegible] [illegible] side of the head [illegible] both drawn [illegible] Africa.

[illegible] our first step [illegible] the problem [illegible] middle of tusks [illegible] like order, however incongruous in appearance, they would not be disposed at chance, or according to no law. It is true that Nature sometim takes strange liberties, refusing to be bou by the strict rules to which our ideas of hom

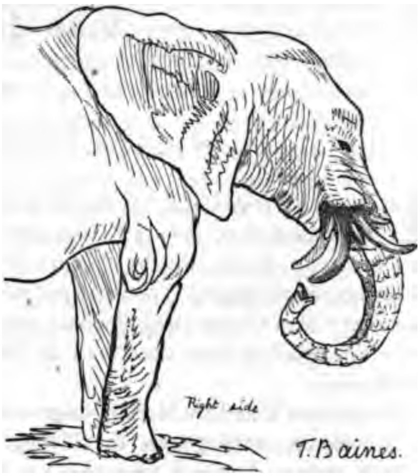


Fig. 1.

logical propriety would confine her; and knowledge of teeth and their developme is still anything but satisfactory. In the sent case we entered on the inquiry with advantage of being able to identify at l two of the nine tusks (the ordinary tus

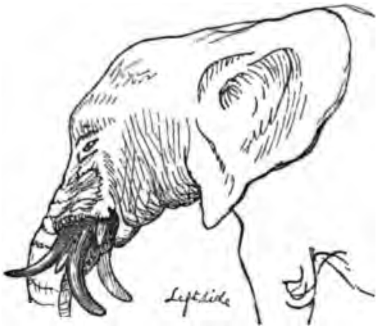


Fig. 2.

[illegible] were thus provided with a starting-p [illegible] serve as a guide to determine the char [illegible] the rest. Wisely distrusting, however, [illegible] qualifications, we had recourse to assistance of two experts, to whose judg all would be likely to defer. Mr Boyd I kins and Professor Huxley have care considered the sketches and facts, and ı is expressed in the following letter ſr Dawkins (which he allows us to —

thank you much for the remarkable which has a very important bearing on :ory of descent with modification. To ɔ the matter as it deserves would far l the limits of a letter. Before, how- : briefly recapitulate what strikes me at I would say that I accept the truth of ›ry told, after the lapse of six years, by ·ican Hunter, although the Africans, as beat even the Cretans in lying. The ar form of the tusks, and their insertion ıe jaw, could not have been the offspring rican shrewdness. There is, however, oint in which the sketch seems to be obscure. The large downward and ard curving tusk *c* apparently springs he same alveolar base as the large nor- .sk *b*, in the sketch of the right hand f the head. It is altogether impossible, as we know of the development of that two tusks of that magnitude could st in the same pre-maxillary. Their e curvature also would oblige their i to assume a diverse direction. There- take it that *c* and *b* do not belong to .me pre-maxillary, as is shewn in the ı of the right side, but to the upper and jaws, as seems to be represented in the ı of the similar tusks in the left side of ad. On the assumption of the truth of ference, the incisive dentition is full of epest interest. Falconer wrote, in 1856, ay to prove that the teeth of Deinothe- Elephas and Mastodon formed formed :ries, and in 1862 (in his essay on E. ıbi, Nat. Hist. Rev.) he committed f to the conclusion that those three ı sprang from the same common ances- nd not from out of the three. Now, to construct an ideal ancestor for the genera, its incisors would assume very the form of those of the sketch. Ele- would necessitate two large upward g tusks in the pre-maxillary; Mastodon, raight tusks in the lower jaw *g* and *h*;)einotherium, two downward curving also on the lower jaw. I cannot believe that anything happens by accident in nature, and, therefore, I would attribute this abnormal incisive dentition to the law of recurrence to an ancestral type, just in the same way as Darwin accounts for the recurrence of the colour in domesticated breeds of pigeons. On any other hypothesis it remains a stumbling-block, and a riddle without an answer. All the elephants posess $\frac{\text{di } 1 \quad 1 \; 1}{\text{di } 0 \quad 1 \; 0}$, but all the Mastodons $\frac{\text{di } 1 \quad 1 \; 1}{\text{di } 1 \quad 1 \; 1}$, all the Deinothera $\frac{\text{di } ? \quad 1 \; 0}{\text{di } ? \quad 1 \; 1}$. This Elephant possessed the incisive characters of the other two genera, plus other smaller teeth, normally undeveloped in the elephant Deinotherium and Mastodon. The teeth seem to be as follows:—

$$\text{Upper}\begin{cases}\text{Left—Incis.} & 1 + 1 + 1 = 3\\ \text{Right }\,\text{''} & 0 + 1 + 1 = 2\end{cases}$$

$$\text{Under}\begin{cases}\text{Left—Incis.} & 1 + 1 + 0 = 2\\ \text{Right }\,\text{''} & 1 + 1 + 0 = 2\end{cases}$$

"The smaller upper incisors *a* and *c*, which are found in none of the three genera, seem to me to be the result of a struggling after the full complement in the Herbivora. If the first small incisor *a* be in its true place, then the tusks of Elephas are not incisors one, as they have always been considered to be, but incisors two.'

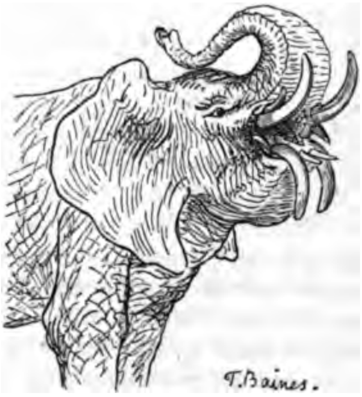


Fig. 3.

"Fig. 3 shews the disposition of the teeth as thus deciphered. A glance at the lower jaw of the Deinotherium and Mastodon, will shew the acuteness of Mr Dawkins' diagnosis, and the *vraisemblance* of his interpretation. Fig. 4. shews the lower jaw of the Deinotherium, and, looking at Mr Baines sketch of the left side of our elephant, it can scarcely be doubted that the large downward and backward curving tusk, which we shall denominate the Deinotheroid tusk, is the homologue of the tusk in the Deinotherium, and that it must have grown in the lower jaw. As Mr Dawkins justly says, there is no room for such a tusk in addition to the normal tusk in the pre-maxillary bones, and although it is not even free from difficulty to imagine how it could find room in the lower jaw, especially from want of length, the difficulty is undoubtedly less there than in the upper jaw.

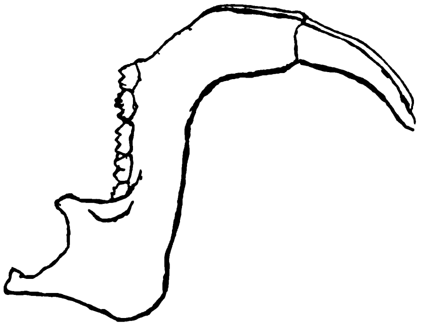
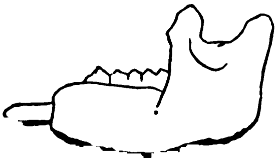


Fig. 4.



[illegible] [illegible] esent the under jaw [illegible] Mastodon, and we [illegible] culty will be felt in [illegible] ght projecting teeth [illegible] astodontoid tusks), [illegible] r [illegible] ing nc[illegible] Ma[illegible] an [illegible] interesting question arises—What incisor, in point of order, do these tusks represent?

Heretofore, we have been accustomed to consider the tusks of the Deinotherium as representing the same incisors (in their order) as those of the Mastodon—that, in fact, the lower jaw of the Deinotherium was merely that of the Mastodon bent down, and that these, as well as the tusk of the elephant and Mastodon in the upper jaw, represented one and the same incisor (in order) in all. We do not know that there is any authority for the belief, or that any one has made it actually the subject of investigation; indeed, there have hitherto been no *termini habiles* from which such an investigation could proceed, but Mr Dawkins informs us that he considers that the current belief among palæontologists is, that the tusks in all three represent the same incisor, based, so far as can be made out, on a theory that if any incisors of any beasts be undeveloped, they *must* be either I. 2 or I. 3; but, as he admits, *ad huc sub judice lis est.* Up to this time the theory could not be called more than a conjectural hypothesis. The new information contributed by this elephant, however, would seem to sweep this theory clean away, and teach us that all the incisors are equally liable to non-development, and that in the same family, now one, now another, and again a third, may in their turn be the subject of excessive development at the expense of the other."

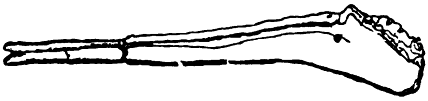


Fig. 6.

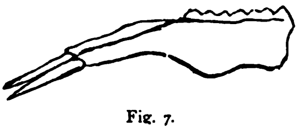


Fig. 7.

To such of our readers as may be interested in following out the theory broached by Mr Murray, we must refer them to the "Journal of Travel" above quoted.

The Country Gentlewoman.

ON HOUSEHOLD SERVANTS AND THEIR DUTIES.

BY THE LATE MRS PARKES.

DRESS OF SERVANTS.

[E dress of men servants is regulated by he style and rank of the families whom :rve. Great neatness, and even a gentle- appearance, is expected at all times in ıper servants, and especially when in ance on their principals. Whether ts be in or out of livery, they must, attending at table, always appear in vhite cravats, and in white stockings, of cotton or silk. Men servants out of provide their own clothes, their wages proportionally higher than those of servants.

:ry, formerly the cavalier's badge of on to some fair lady, whose livery he ed at "tilt or tournament," is at present mark of service.

:ry, in some families of quality, is a part inheritance handed down to them in sion from one generation to another, :nerally has some relation to the colours arms. Of those who have no long line :estry to boast of, the livery is often of fancy and choice only, and is costly in according to the style, fortune, or of each family, and on whom, and not servants, the charge of providing it falls. ivery consists of a complete suit of s. The allowance of suits in a year to servant varies in the different families teel life, from two to one suit of dress with one suit of undress clothes, to be during the hours of work, or during onal absences from home of the family. ıat each year is generally provided by aster: but linen, gloves, stockings, and the livery servant provides for himself. so pays for his own washing, with the exception of his linen, jackets, and aprons which are usually sent to the laundry to be washed, or with the family linen.

At tables where style is kept up, servants are expected to attend in silk stockings, and with either silk or white kid gloves. In such houses the wages are, or ought to be, proportionally high. The use of gloves in waiting at table has superseded that of the table-napkin wrapped round the hand of the servant employed in presenting articles to those at table. Neater in appearance, and less troublesome to the waiter, the use of gloves may be regarded as an improvement on the old fashion; but it is somewhat more expensive to the servant.

For the rough business which footmen undertake to do, when they enter families where only one man servant is kept, the master usually provides his footman with a coarse jacket and large trowsers, which cover over the whole of his dress. Jackets of linen, or coloured cottons, and white aprons, are also allowed him, in which he may, without impropriety, answer bells in the morning. In this dress he usually performs much of his morning's work, and dresses himself either before luncheon, or before the dinner hour.

A coachman has one livery, also two hats, and two pairs of boots, allowed him annually, and a box coat once in three or four years; also one or two stable dresses, consisting of rowels, a jacket, a waistcoat, and one undress frock coat.

The under coachman has nearly the same allowance of clothes. To grooms are allowed yearly two suits of livery and two stable dresses. To postillions three sets of jackets in two years, and a cap yearly.

The dress of female servants, although usually left to their own discretion, may be, and generally is, influenced by the opinion of their employers as to its suitableness and consistency. A mistress may require her maid servants to expend a portion of their wages on neat and creditable clothing. Beyond this she may have no right to interfere; but by a judicious use of her influence she may restrain them from running into extravagance and inconsistency of dress, and consequently from many errors into which their vanity might lead them. Of late years the low price of most of the articles of clothing has introduced into many classes a more showy style of dress than they formerly indulged in, and among maid servants this is particularly evident.

Of neatness of dress all must approve: it is inconsistency, in point of expense, of form, or of colour, with the means or daily avocations of any class of society, that alone is censurable.

In large establishments of servants, there are different ranks, as in more general society, in which the avocations vary, from those which are laborious to those comparatively light and easy. In the discharge of these different employments, a different style in dress may be not only admissible, but consistent. The housekeeper and lady's maid may, with propriety, approach nearer to the style of dress of their employer than the house maid, laundry maid, or under servants, though in all the same general principle should be the guide.

Cleanliness of dress, whatever may be their employments, all servants should regard as one of their essential requisites. In the upper servants there can be no obstacle to its observance: the difficulty may be greater with those [illegible] engaged in the more laborious duties [illegible] with the [illegible] habits of [illegible] part of their employment [illegible] cleanly manner; with [illegible] is as evident. One servant will [illegible] by her dress, another scarcely hide. the nature of her employments; so great a difference in habits is there even in this one point.

To the habit of neatness the same remark will apply. Neatness and cleanliness may indeed be regarded as inseparable qualities, the one being rarely found without the other. The same habit of mind tends to the cultivation of both; and where these qualities are found, there also we may look for greater consistency, for a better taste it may be called, in dress.

To the love of finery are often united habits of untidiness and uncleanliness. It is no uncommon thing to see slovenliness among domestic servants in the morning hour, and in the evening a dress inconsistent, both in expense and style, with their station and means.

In families requiring the attendance of maid servants during the morning hours in the parlour, or at the house door, the neatness of their morning dress is as important at that of the evening, although, from the difference of their employment in these divisions of the day, a change of dress is both allowable and desirable.

Among the articles of dress which must be regarded as inconsistent with any degree of domestic servce may be enumerated silk gowns and silk stockings, blonde, lace, feathers and artificial flowers, bracelets, necklaces, rings, and ear-rings. Will it be considered as entering too much into particulars to mention with censure the common mode with which maid servants dress their hair? In the morning they are disfigured with tiers of curls in paper; in the afternoon sometimes decorated with long pendant ringlets, to induce which, much time is bestowed at night, when, if rest be not needful to them, they might be better engaged in repairing their clothes. A servant of correct taste in dress would never appear in curl papers, nor keep her hair of such a length as to require more than very simple curling.

The outlay in dress the wages of each servant should regulate. Those who have low wages will not, if they reason rightly, attempt to vie in dress with those who have higher wages. Propriety and prudence alike condemn such attempts in them, as much as in the wife and daughters of a man of small income, were they to compete in dress with those of superior means.

In servants' dress two-thirds of the wages only should be spent. The remainder, left in the hands of their principal, or placed in savings' banks to accumulate, may prove a means of comfort to them beyond comparison greater than the transient pleasure which a more expensive dress might give them. In the following tables will be found estimates sufficiently accurate to show, that with judgment in the choice of the materials, and a proper subordination of the inclination for dress to the means for obtaining it, a third part, or even more, of wages, may in most cases, be untouched, and yet the personal appearance of the servant not neglected thereby, but rather improved, inasmuch as consistency in dress is always one of its most becoming attributes.

Tables of maid servants' dress consistent with wages :—

TABLE I.—Wages, £7, 7s.

	£	s.	d.
1 good cotton dress, at 8d.	0	7	8
2 common working gowns, at 6d.	0	7	0
Linings for dresses	0	2	0
4 petticoats	0	8	0
Body linen	0	4	6
Stockings (3 pairs)	0	6	0
Muslin for caps and kandkerchiefs	0	6	0
Bonnet and trimmings	0	10	6
4 chequered aprons, 2 white do.	0	6	0
A shawl	0	12	0
3 pairs of shoes	0	12	0
2 pairs of gloves	0	1	6
Sundries	0	10	0
	£4	13	2

TABLE II.—Wages from £12, 12s., upwards

	£	s.	d.
3 gowns (making, &c.)	1	10	0
Petticoats	0	12	0
Body linen	0	6	0
4 pairs of stockings	0	6	0
Aprons	0	7	0
Caps, habit shirts, ribands, and gloves	1	0	0
2 bonnets and trimmings	1	0	0
Shawl	0	15	0
3 pairs of shoes	0	12	0
Sundries	1	0	0
	£7	8	0

CUSTOMS AND RULES AMONGST ESEABLISHMENTS OF HOUSEHOLD SERVANTS.

In all large establishments of servants one rule invariably prevails. The men and women servants during the intervals in their employments are never allowed to sit together in the same room. Each, men and women, have their respective places of resort. At dinner and supper time only do they assemble together. This regulation it is the duty of both the steward and housekeeper to see observed, as experience has proved it to be favourable both to the morals of the individuals of establishments, and to the proper fulfilment of each branch of household work.

To the housekeeper's room, lady's maids repair for breakfast, tea, and supper, and at all other seasons of leisure. Here, also, butlers and valets are admitted to tea and breakfast, but not at other seasons. The still room maid waits upon the housekeeper, and those in her room.

The steward's or butler's room is the place of resort for the upper men servants; and in houses where a second table is still allowed, the dinners and suppers of the chief members of the establishment are served in the steward's room, the steward's boy waiting at table.

The still room, formerly the place in which waters of various kinds were distilled for domestic use, and where the housekeeper still prepares confectionery, and all the sweetmeats requisite for desserts, is also the place appropriated to the use of the female servants, who rank below lady's maids. In this room they breakfast and have tea, and to this room, after dining in the servant's hall, they withdraw; and, under the superintendence of the housekeeper, the housemaids occupy themselves there in repairing or making the household linen.

The servants' hall, in which both men and maid servants have dinner and supper, is also the place to which all the men below the butler repair when disengaged from their several occupations. In this place the kitchenmaid, and the boy who cleans the servants' knives and forks, wait at table. After each dinner and supper the parties separate, and adjourn, as above-mentioned, to the several places appointed for them.

The nurseries are the proper places for those who have the charge of the children in them to remain in during the evening. Their attention ought at that period to be given to the repairing or making of children's clothes. Nurses and under nurses always have their meals in the nursery. In some places the head nurse has the privilege of supping in the housekeeper's room, provided all her charges are well and asleep.

Order in which the members of a household establishment rank themselves :—

MEN	WOMEN
House steward	Housekeeper
Valet	Lady's maid
Butler	Head nurse
French cook	Head cook
Footman	Upper housemaid
Under butler	Still-maid
Coachman	Upper laundrymaid
Groom	Dairy-maid
Steward's boy	Under housemaid
Stable boys	Under laundrymaid
	Kitchen-maid
	Scullion

In establishments of the highest rank there are grooms of the chamber to be added to the above list. The duty of these individuals is to remain in the ante-room ready to usher visitors into the drawing-rooms, and to superintend the appropriation of the several bedrooms, place, send off, and receive the trunks, &c. of parties visiting at the house.

In establishments where there are neither steward, housekeeper, nor butler, the cook presides at table, and is in some measure regarded as responsible for decorum and good order being observed by all seated round it. In such small establishments there would be [illegible] regulations which [illegible] there [illegible] the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] themselves in read[illegible] writing

PERQUISITES OF SERVANTS.

The perquisites of servants are, in many cases, so many encroachments on the property of their employers, who tacitly allow them, while they, in principle, condemn them. Perquisites are amongst the circumstances which tend to corrupt the morals of household servants, and as such their continuance is most objectionable. At the same time, it would be difficult to eradicate the evil which is, by prescription, become almost a domestic law. Why it has so corrupting an influence amongst a household it is not difficult to perceive. It places the interest of servants in opposition to those of masters. What is gain to the one is often loss to the other; and in taking only a short-sighted view of his interest, a servant's integrity is not always proof against the temptation of immediate gain. The barrier between honesty and dishonesty being once broken, who can say how often it will be passed?

Amongst the perquisites, the first that may be noticed as objectionable is that of vails or gifts in money from visitors to servants. The custom is a species of bribery for services which ought to be performed without it, and it has a tendency to make servants less attentive than they ought to be, towards such visitors as cannot give them great pecuniary rewards. For such gifts servants are seldom the richer; they often employ them in gratifications which it would be better for them to forego. The custom is growing into disuse, and some very respectable families make it one of the rules in hiring their servants, that they shall accept of no such gifts, but when offered shall inform the visitor that it is contrary to the rule of the house to take them.

Perquisites of cooks consist chiefly in dripping, commonly called "kitchen stuff." This perquisite is very generally allowed, probably from the difficulty of keeping any check upon [illegible] use of it, if it were not allowed. [illegible] temptation to purloin should be in all cases as much avoided as possible; but in this particular instance it is scarcely possible to avoid it. If the perquisite be forbidden, no one can tell if the cook will not furtively secure it to herself. If it be allowed her, another temptation assails her—that of obtaining as much of it as she can by practices mean and despicable. A cook who grasps at making much of her dripping often over-roasts joints of meat, by which the fat is melted into the dripping-pan. She neither protects the fat from the fire by covering it with paper, nor bastes the surface of the meat to keep it moist and rich. She trims from all joints all external fat, to add to her hoards; she uses for frying and for common pastry expensive materials when she has that at hand which would answer as well, and would more honestly employ the melted fat which is obtained in roasting meat.

Perquisites of butlers or of footmen, where butlers are not kept, are chiefly the ends of wax and mould candles; and in the department of the oilman's book many peculations are often practised undetected.

The dairy maid, if she has charge of poultry, considers the feathers, when the poultry is killed, as her perquisite. As this may be an inducement to take proper care of the poultry, it may not be a privilege of so injurious a nature as those before noticed.

HIRING SERVANTS.

In hiring servants, all will desire to have those who have spent most of their years of service, and especially their earliest, in families whose principles, habits, and general bearing in their rank of life, are of the best and most respectable description. It would signify little, whether such families were of high or inferior standing in society, provided their habits of life enforced on all around them the love and practice of neatness, order, regularity, and cleanliness, and the still more essential qualities of integrity and sobriety. In hiring servants it is also desirable to have those whose immediate relatives and connexions are respectable, however poor they may be. Those who hold their relatives and friends in respect will not be indifferent to their own characters; they will desire to do credit and not to disgrace an honest parentage, and thus the pride of respectability will be turned to its right use.

In regulating the conduct of servants, it is requisite that the legal points in the business should be known. Indeed, the servant, equally with the master, should understand the rights which are mutually possessed, and in what respect the infringement of these rights on either part would affect their contract: in some cases they would find themselves amenable to legal process. Each party should know that servants may be legally punished for insolence, and for assaulting master or mistress; that they may be fined for drunkenness, gaming, cursing, and swearing; that if by misdemeanour they are legally detained from their master's house, the contract between them is void. On the other hand, if not chargeable with misdemeanour, the master cannot discharge them from his service without paying them that portion of the year's wages which was agreed upon between them on hiring, or allowing them to remain in his service for a stated time after giving them warning, unless the separation takes place by mutual consent.

On this head the usual agreement between principals and household servants is to allow on each side a month's notice to be given, or a month's wages to be paid.

Register offices, sometimes resorted to by those who are seeking for servants, have not of late been in much repute, because servants of indifferent characters more frequently apply to them for places than those of a better description. In the metropolis, housekeepers who are constantly engaged in business prefer to avail themselves of the assistance of these offices in suiting themselves with servants, rather than to leave in search of them their lucrative employments. Such persons, not always requiring characters of those whom they take into their service, seldom give any on parting with them, and they reserve to themselves the power of dismissing such servants at a moment's warning; they on their part can, if their convenience or inclination induce them, leave their service immediately. Although the common register offices are little esteemed, there are institutions of more recent establishment, which at present bear a better character, and are founded on better principles. They have for their object the encouragement of respectable servants, as well as the convenience of housekeepers, and their security from the evils of disreputable and dishonest inmates. Servants whose characters cannot bear the strictest investigation will scarcely apply to such institutions, if the promises and regulations of these establishments are observed; for they profess to be so scrupulously minute in their inquiries into characters, as to preclude the necessity of those who are hiring from their office taking any concern or trouble in the business themselves. Of these institutions, there is one called the Protector, and another the National Benevolent Institution; the former is in Great Russell Street, London, the latter in Bedford Row.

The Protector Institution profes combine other advantages besides t supplying families with servants, the object of a common registar office. conductors of the Institution engage, precautions they take in applyin characters, to lessen the difficul obtaining good and efficient servants. profess to admit of no recommendation parties of doubtful estimation, nor to sider slight, careless, and evasive answ their inquiries as satisfactory. They vour to detect the fraudulent practic which characters are obtained, and zealous and rigid investigation to secure office from the application of these se whose conduct will not bear the scrutin

THE

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FARMING STATISTICS.

TIME was, and that at a period not very far back in the history of agriculture, when it seemed to be one of the things which ld never come to pass that we would have plete and trustworthy "returns" con- ed with the business of farming through- the country. Despite the most elabo- and the most painstaking statements le from time to time, as to the advantages h would accrue to the nation, by the esta- ment of such a system of statistics—a em which would be beneficial to all, hurt- to none—the farmers of the United gdom, as a body, persisted in treating the le question, if not in a determined spirit sistance, at least of the heartiest apathy indifference. Nor would this have been nuch wondered at, if the statements of advantages, and the pressure of opinion to the importance of having these red, had come from men not in any- connected, or connected but remotely the interests of agriculture; but room surprise was and is still open, that this ld have been so when all the urgency pinion on the point came from those ely connected with and heartily interested e practice of farming. It ought, so we k, to have given rise to no suspicion that in eagerness to persuade farmers through- the country to give returns of their crops stock, no hidden purpose of serving an est could have been in the minds of who certainly were, in every respect, entitled to be called, as they really were, the "friends of the farmer." But this suspicion, if not something more, did find a place, and to such an extent, that all attempts made to urge the general giving in of those "returns" were apparently hopeless. But as time progressed, juster views were taken by those connected with the practice of farming, and gradually oposition died out, and at last we are now apparently on the eve of a new era in the history of agriculture, when we shall be no longer groping, as it were, in the dark, knowing nothing of how we stand in the yearly balance of the work of the nation; or, at the best, having only vague guesses or conjectures to base our calculations on. But from this it will be seen that we have not *yet* arrived at the period when the system is fully carried out—the system of complete and trustworthy returns. Trustworthy we believe they are, so far as they go, but complete they cannot, unfortunately, be said to be until they are generally carried out. And this will not be till the indifference and the jealousy which unfortunately yet exists amongst so many, and which compels them to refuse information, is overcome. Certainly, it is worth while for those who are so jealous or indifferent to consider that, after all, at the point to which the system has now arrived, that their refusal to give returns does not very materially influence the value of those which are given by those who are more enlightened, at all events, more liberal, in their views. In cases where information is absolutely refused, the greatest care is taken to obtain some estimate of particulars; and it is worth while for those who do so refuse to consider that information may after all be obtained, when information is persistently refused, in a great measure independent of themselves. Let us hope, however, that with advancing time, advancing opinions will overcome present prejudices. It certainly — to put the matter in the mildest form — does seem a strange thing that the dignity of the profession or art—call it what you will—of farming, should so suffer by the indifference of those connected with it to what in reality constitutes its best interests. We have long had the fullest possible information as regards the annual position of various branches of our trade and commerce, but we have known nothing, or comparatively nothing, respecting the most important of all sources of actual wealth. On nearly every point connected with agriculture, we have had to form the roughest of estimates and the vaguest of conjectures. But valuable as statistics of farming would be to the farmer in carrying on his daily business, as similar statistics in certain branches of trade are valuable to manufacturers, it is, nevertheless, but right to remember that there are those who believe that there would be, and is, no really great amount of practical value in them. And this opinion is held by those engaged in practical farming whose position entitles their views to be considered with respect, although we may not be able to receive them without reserve, or with confidence as correct. But, granting the no, or the little, value of farming statistics, in one practical point of view—which, by the way, we are not disposed to grant—even those holding this opinion may be inclined to admit that such statistics would be valuable in another, and perhaps not less practical direction. Assuredly such statistics would present much, that, while interesting, would be suggestive, and if they did not give immediately, would probably give at no very distant day, some hearty and healthy stimulus to practical farming; inasmuch as they might yield information, which might reconcile discrepancies, explain anomalies, and expose fallacies connected with the practical farming of the country.

We have been drawn into these remarks by the recent issue of the Agricultural Returns for 1868, the preliminary and able report attached to which, is from the pen of Mr Fonblanque. The matter not only comprises tabular statements with reference to live stock and crops of the United Kingdom, but also the returns for the British possessions and of foreign countries. The following is a list of the tables introduced in the report (which may be obtained at her Majesty's Stationery Office, Abingdon Street, Westminster, for the sum of fourpence):—

I. *Abstract of each Division of the United Kingdom.*—1. Population, area, abstract of acreage under crops, &c., and number of live stock. 2. Total acreage and per-centage proportions of each kind of corn and green crop.

II. *Abstract for each Division and County of Great Britain.*—3. Population, number of returns obtained, average extent of land returned by each occupier, total area, abstract of acreage under crops, &c., percentage of corn crops, and total and proportionate number of live stock.

III. *Acreage Returns for each Division and County of Great Britain.*—4. Total acreage under crops, &c., and acreage under each kind of corn crop. 5. Acreage under each kind of green crop, and under flax, hops, bare fallow, and grass.

IV. *Live Stock Returns for each Division and County of Great Britain.* — 6. Number of cattle, sheep, and pigs.

V. *Returns for British Possessions.*—7. Population, area, and acreage under crops and grass. 8. Estimated quantities of the principal kinds of corn and of potatoes produced. 9. Number of cattle, sheep, and pigs.

VI. *Returns for Foreign Countries.*—10. Population, area, and acreage under crops, bare fallow, and grass, compared with the same for the United Kingdom. 11. Estimated quantities of the principal kinds of corn and of potatoes and beetroot produced. 12. Estimated average yield of the principal corn crops, &c. 13. Number of cattle, sheep, and pigs, compared with the same in the United Kingdom.

But valuable as information like the preceding really is, we do not conceive that farming statistics are complete—in the fullest sense of the term—until other returns are embraced. We should like to know the statistics of drainage, for example—how many acres are drained, and how drained; the points connected with arterial drainage, and of the outfalls of rivers, &c.; information as to the extent of land under irrigation, the number, extent, and position of land under the, at present experimental, treatment of town sewage. We should like to know the details connected with the waste lands of the kingdom; how much is yearly done in the way of reclaiming them, and what have been or are the processes by which they have been so reclaimed. And, in addition to knowing the extent of land under crops or grass, we should also know the extent under timber. Very valuable also would information be—of the kind contemplated by some foreign governments—of the peculiarities and classes of soil in the various districts of the kingdom, the annual rainfall in each, average temperature, &c. Still more valuable would this department be if it comprised returns connected with rotations, use of artificial manures, &c.; and there would be additional interest added to the whole returns if others were given relating to farms to which steam-cultivating machinery has been adopted—the number of steam-engines employed on farms, and other classes of machinery, as thrashing machines and the like. Returns already presented to Parliament in years gone by, have given us information respecting the wages of agricultural labourers; it is difficult to see why these returns should not be continued, and why they do not form part of such returns as we have now before us. But in addition to information as to wages, we would be all the better if we knew other points connected with the labour question. We should be rather startled if those gentlemen connected with the statistical department of agriculture were to do for us with regard to the condition of our rural dwelling-places—if, indeed, many of them are worthy of the name—what the Health of Towns' Commissions have done with regard to the condition of our towns and cities. To do all this would assuredly involve a vast deal of trouble, but no work can be done without this; questionable, indeed, is the value of any work (so-called) which does not involve time and labour. But when done, the work would be worth contemplating, and valuable in many respects, and in none more than this, that, in the words of a celebrated writer on agricultural topics, it would exchange "doubt for certainty, guesswork for fact, error for truth, and, in doing so, hold up a mirror that can neither flatter nor distort." There is nothing to gain, everything to lose, by doubt and uncertainty regarding our position; the more fully we, as farmers, know about it, the better for ourselves, the better for the community, to whose welfare we so largely contribute, and the better for that art which, the oldest and most honourable of all, is, indeed, what the antients designated it—the art which nourishes all the other arts.

THE EMPLOYMENT OF WOMEN AND CHILDREN IN AGRICULTURE.

[Abstract of a paper in the *Saturday Review.*]

THE typical foreigner is probably unequal to the study of the British Blue-book, otherwise the national habit of self-examination must often startle him. There is no public analysis of their own social condition by Germans, Italians, or Frenchmen. Here and there an elaborate treatise on the state of a department or of a trade is produced by some famous publicist. But such works are the result of personal option and personal judgment. They do not emanate from official inspiration, and are clothed with no official authority. They lead to no public or legislative action, and excite no interest beyond the narrow circle of professed philanthropists and statisticians. Nobody in France, out of this circle, knows, or cares to know, aught about the habits, means, wages, or health of the peasantry of Normandy or Auvergne. And it will be long before even the Liberal section of the Prussian Parliament occupies itself with the condition of the people who till the ground and live on black bread and vegetables. We, on the contrary, love to turn our social body inside out, to inspect its irregularities or deformities, and to give the results of our contemplation to the world. Our soldiers, our sailors, our miners, our factory workers, our weavers, and our spinners, have in turn been the subjects of Parliamentary discussion and of Royal Commissions. If foreigners only knew English, they would be able to diversify the ordinary tenor of their pleasant raillery at us by many a spicy extract from the national confessional of our Parliamentary blue-books.

One of the most important in the last series is the Report of the Commissioners who were sent to inquire into the condition of women, young persons, and children employed in agriculture. Ostensibly limited to the labour of females and children in the fields, the inquiry has diverged into the general condition of the agricultural poor of England. And this the Report makes out to be very far from satisfactory. Yet it may be questioned whether the standard which the Commissioners have applied is not too ideal for the usages and practices of our everyday working life. This seems to be the one dominant vice of all Commissioners' reports. They are nothing if not virtuous. They set about their task with such a lofty canon of virtue in their own minds, that everything they witness, or are told, strikes them as falling short of their [illegible] detracts some- [illegible] opinions and [illegible] ness of sen- [illegible] grounds [illegible] the re- [illegible] after [illegible] there remains enough to excite commiseration and to justify the demand for inter[illegible]. The first subjects of the inquiry were the children. It appears that children are sent into the fields at the age of eight. They are too young and weak for really hard work. But there is a good deal of necessary labour which they perform. They "tent" the fields—that is, they watch them, and frighten away the birds. They naturally take part in the work which requires stooping, such as dibbling in peas, pulling up turnips, and weeding. For such work they may earn a shilling or two a week. It is contended—and this view is supported by the Commissioners—that, instead of working in the fields at this tender age, the children should be sent to school, and kept there till they are eleven or twelve years old. This is, of course, the view which the Commissioners and the clergy are sure to take, and it will be generally approved. One of the most zealous of the Assistant-Commissioners, Mr Fraser, asks for the enactment of a law which shall require "regular uninterrupted attendance at school up to the age of ten; and for the two years beyond ten and twelve, while the child is at work, a certain amount of attendance, as suggested by the Norfolk Chamber of Agriculture, either at day or night school, during the greater part of the year." Of course it would be desirable if this could be done. But can it? The whole evidence collected by the Assistant-Commissioners shews that the ordinary life of the English agricultural peasant is inconsistent with these fine projects for his intellectual improvement. Children must, to him, be one of two things—an assistance or an incumbrance. They must divide with him the bread which he alone earns, or they must contribute to the household store. It is a hard thing for a father of a family earning his 13s. per week to keep five children between home and school, of whom one, if not more, might bring home a weekly contribution of 1s. 6d. In these humble abodes, the difference between 13s. and 14s. 6d. a week is acutely felt. And it is this consideration that runs through the whole subject of agricultural labour. How can they, who are waging a daily fight against indigence, afford to pay for luxuries? In the eyes of the farm-labourer, education is a luxury. Its advantages are re-impalpable, and, in his opinion, uncer- But what is clear and certain is, that y who is working in the fields brings in money than the boy who is learning at l. Of course, the peasant's view is a ighted one. But it is only just as short- d as that of others who are unable to the comparative advantages of present and present parsimony. It is not only ltural peasants who refuse to see the of giving time and money to their chil- education. We have all much to learn Scotland in this respect. And it is not ly that, for one case where the return e sacrifice would be ample, there might cases where it would be inappreciably

The labouring man, therefore, encou- the labour rather than the education of ns. The same consideration bids him ut his wife and daughters to field-work. are certain kinds of work which women o as well as men, and which they do er than men, and which, therefore, the rs intrust to women more readily than n. The earnings of a wife and daughter dd sensibly to the gains of a family. It refore, hardly consistent with human that the labourer should not embrace portunity of increasing his store. His arnings, at the best, are not high; in cases, they are not regular. When there ng frost, or when he has a bad rheuma- e is off work, and, in many cases, off also. So that, on the whole, it is not wondered at if he wishes his wife and n to help him by their labour when an.

it is said, this life is brutalizing and de- zing. The boys grow up stupid, heavy, , not only without the power of reading iting, but without the power of observ- d reflecting; while the girls in the field- lose all respect, not only for chastity, the semblance of decorum; and if not in their morals, become utterly unfitted duties of wives. We fear that there is ch truth in this. At the same time, the tion of one class of people by an en- ifferent class is liable to exaggeration. With regard to the condition of the women and children in certain districts, it is simply abominable. But this is confined to certain districts, and is owing to causes which we shall notice later. What we wish now to remark is, that inspectors and clergymen are generally prone to exaggerate the evils which they witness. They forget that, at the best, the whole weft of agricultural life is almost necessarily coarse; and that it is unreasonable to expect from men who have toiled all their days on a farm the same decorous speech as they hear from smug tradesmen in a country town. There will always be a plainer and a homelier phraseology among country labourers than among city artisans or domestic servants. But there need not be that shameless immodesty and disregard of chastity which seems to characterize some of the female gangs. At the same time, some of the Assistant-Commissioners might have asked themselves the question, whether, bating the obscenity of the language, there was so very great a difference in the actual morality of the labouring class and that of a class very much above them. It is true that the young women are often unchaste, but the general testimony of the Northumberland witnesses shews that the same girls who are unchaste before marriage are often eminently chaste after marriage. There is no greater mistake than to suppose that grossness of language necessarily indicates immorality of conduct. The young ladies of the Tudor period indulged in much coarser phraseology than the young ladies of our period; but it would be a very incorrect inference that they were less virtuous than the young ladies of our period. The daughters of respectable farmers, sixty or seventy years ago, spoke much more broadly and plainly than the daughters of farmers of our day; yet we have no reason for thinking that they were a jot less virtuous. Mere working in the fields does not necessarily corrupt the morals of women. It hardens and roughens rather than depraves their characters. It gives a masculine tone to them, and impairs what is left of feminine softness. And if it were possible to have gangs of girls working only with the women, coarseness of language would be the result rather than immorality of conduct. Women work in the fields of agricultural France and Germany. Their work is heavier than that of men; their food and language quite as coarse as those of men. But—bating a kind of rough and indecorous phraseology—there is not so much systematic profligacy in the villages as in the cities of France and Germany. And there is with them, as with us, the virtue of undeniably hard and healthy work. It is not the solitary fact of adult female labour, or of juvenile female gangs, which causes female immorality. It is the concurrence of this with home training which precedes and accompanies the field-work, which, while it confirms the coarseness, saps the morality. It is the herding together of girls and boys, young men and young women, in the one room of the insufficient and crowded cottage. It is the enforced and unnatural suppression of the native instinct of modesty in the miserable hovels, which the unwise and unholy parsimony of the landlord or the speculator has stinted in quantity and quality. It is the foul and incestuous life in the cottage which generates the open and flagrant immorality in the fields. In the parts of Northumberland where wages are good, and cottages well built and roomy, the conduct of the peasant women is substantially virtuous and correct. It may not satisfy the requirements of clerical inspectors or fastidious censors, but it will satisfy the expectations of most reasonable men. The women talk the language of their caste, which is not that of drawing-rooms. They expiate their precocious slips from virtue by irreproachable fidelity as wives and mothers. It is in the [illegible] counties, where there are close parishes [illegible] where the house accom- [illegible] some [illegible] altogether with [illegible] labour [illegible] the same home life which both harden[illegible] and depraves the men, not the occasional feasts and their rollicking incidents. Although the songs and "chaff" at the harvest-feasts are singularly gross and revolting to refined tastes, some of the Commissioners and Assistant-Commissioners may have heard something not extremely dissimilar at a Cambridge supper-party, or even in the days of Temple pupil-hood.

Let us not be supposed to say that this condition of things is one that does not loudly call for improvement. We only say that the grandly serious treatment of agricultural frolic and love-making, if extended to other circles, might give the world a picture of English society which we should not like to dwell upon. Although the Strephon and Daphne of the English counties make love rather openly and grossly, there is at bottom not much more immorality in their intercourse than in that of young De Boots and his Traviata. Of course, there is a difference between the undisguised openness of the one and the conventional concealment of the other pair. But, if education is to improve morality, it must be extended above the denizens of the Eastern Counties peasants. And this is what the peasants themselves feel. The dullest and stupidest of them hates to be preached at. And we are not sure that he is wrong. It must be very aggravating to a poor man who has been toiling from 7 A.M. to 6 P.M. on a cold wet March day, and who comes home thrice soaked through to a not very strengthening supper, to be catechized by a well-fed and well-dressed gentleman respecting his earnings, his wife's earnings, and the duty of sending his boys and girls to school. If he could only find words in which to vent his indignation, he might ask his critics whether a man who was labouring hard the greater part of the year from morning to night for his family was not to be excused some breaches of manners and some outbreaks of gaiety. And if he did send his children to work, instead of school, was it not the normal discomfort in which he habitually lived that made every additional sixpence which they might earn a matter of importance to him and them? If, too, he were taunted with the temptations and cor-

ns to which his daughters were exposed
ld labour, might he not retort that the
of moral corruption had been begun by
sufficient and ill-constructed houses in
he and they were compelled to live?
had a better house and better wages, he
ot deprive his children of a good edu-
or subject them to a moral taint. But
ossible to get these higher wages and
homes out of the existing fund of agri-
l profits? Who will build cottages
t regard to interest, or pay wages with-
ference to profits? On this point we
hereafter recur to the Report of the
issioners. That the evils which they
ut are grave, nobody will gainsay. But
e can fail to see that they are evils
it is hopeless to correct by sudden and
ale legislation; that their mitigation de-
on changes affecting the whole agricul-
ass; and that their extirpation will only
cted when machinery does the work, not only of women and children, but also of men. The day will perhaps come, sooner or later, but it is far more likely to come later than sooner. It came early in America, because, in America, the supply of land was unlimited, while that of men was stinted. And it will not be till the agricultural population of England has been diminished, by some cause or other, that women and children in the rural districts will be relegated to the duties of home and the labours of school. Meanwhile, much may be effected by the existing Acts which limit the age of children employed in the fields, concurrently with the exertions of far-sighted landowners and the clergy, to whose zeal the agricultural poor owe all the moral advantages they possess. By these means an improvement may be made in the condition of the peasantry, which, though slow, will be not less sure than that which has been made in the condition of the farmers since the beginning of the present century.

The Farm.

ON SOME POINTS CONNECTED WITH THE SCIENCE OF CATTLE FEEDING.

IN our last, we gave a series of analytical tables, shewing the chemical constituents of food used in cattle-feeding, and ventured to present a few remarks to shew that we did not look upon chemical analysis as being able, positively, to decide what the value of a food was for feeding purposes under different circumstances of cultivation, &c. But we, at the same time, pointed out that, as indicative of the relative feeding value, or, at all events, as characteristic of farm produce, chemical analysis was of great service. At this point of our inquiry, and as bearing upon this question of relative value, the following table, from an article by Professor Tanner, will be valuable:—

Materials.	Composition.			Feeding Value.	
	Non-nitrogenized Matter per Cent.	Nitrogenized Matter per Cent.	Water per Cent.	As Proved.	Per Cent.
				lbs.	
Barley	56.	13.	14.83	6 to 1	16.7
Oats	55.5	13.6	12.8	7 to 1	14.3
Beans	48.5	23.3	14.8	8 to 1	12.5
Peas	50.	23.3	14.1	8 to 1	12.5
Linseed-cake	13.52	28.56	8.6	[illegible] or 6 to 1	16.7
Linseed-cake and Peas, equal	31.76	[illegible]	[illegible]	[illegible]	22.2
Rape-cake	11.3	[illegible]	[illegible]	[illegible]	16.7
Cotton-cake	30.4	[illegible]	[illegible]	[illegible]	16.7
Clover hay	40.	[illegible]	[illegible]	[illegible]	8.3
Swedes	[illegible]	[illegible]	[illegible]	[illegible]	.66
Mangolds	[illegible]	[illegible]	[illegible]	[illegible]	.66
Carrots	[illegible]	[illegible]	[illegible]	[illegible]	.66

[illegible] column [illegible] gives th[illegible] in the production [illegible] lb. of meat by the consumption [illegible] of so many pounds of produce of any of the varieties named. Thus, by the consumption of 6 lb. of barley and of 8 lb. of beans, 1 lb. of meat is produced, while it takes 150 lb. of swedes to produce the same weight of meat. But valuable as this table *is*, the results indicated must be taken as only approximative and relative—for if the reader will turn to the concluding paragraph of the first article (see *Country Gentleman's Magazine* for January, 1869), he will find there named certain considerations which go much to modify feeding results of any kind of food given. As supplementary to these remarks, we here give a rapid *resumé* of considerations which must be taken into account in estimating the practical value of any kind of food, as given by Dr Voelcker, one of the most eminent authorities of the day, on the subject now under discussion. These are, as we have elsewhere given them:—1st. *The age of the animal.*—For young animals, food rich in nitrogenized and poor in woody fibrous matter is required; bone-forming materials are also required. 2d. *The various kinds of animals.*—The food fitted for horses is not the best for cows and sheep. 3d. *The natural disposition or temper of the animals.*—While a shorthorn fattens rapidly, a Kerry or a Welsh cow rarely fattens. 4th. *The purposes for which animals are kept.*—The difference between fattening store cattle and keeping milk cows in good condition is obvious enough. Again, horses working hard in spring and summer, scarcely keep up on the same food which will fatten them—being in the stable—in winter. Again, although we reason with some degree of probability on the faith of analyses as to the feeding properties of food, it should not be

ight of that these may be greatly modified
e way in which they may be assimilated
he animal organism of the animal fed
them. Hence arises the importance of
ding to the digestibility of food. Un-
nately, comparatively little is known
t this important process, so that nothing
be predicted with certainty about it. But
v of the conditions on which the digesti-
y of food depends, are stated by Dr
lcker, of which the following is a brief
me:—

On the kinds of animals.—These cows
e readily assimilate the nutriment in cut
v than horses, while sheep do not so
ily digest chaff as cattle. 2. *On the*
unt and character of the woody fibre con-
d in food.—As a rule, woody fibre is less
y digested than other constituents of
. Its condition also affects the nutritive
e of food in which it is present. The
fibre of plants is readily transformed into
ning substances, while the hard fibre of
or fully ripened plants passes almost
ely through the animal. 3. *On the*
unt of flesh-forming substances.—Food,
in these, should be given sparingly to
e; while for horses, subject to rapid
e of muscle, it is well adapted. 4. *On*
bulk of food.—The bulk of food contri-
s to the healthy action of the digestive
ns. The bulk is, however, subject to dif-
ces, according to the animal: thus, horses
ire less bulk than cattle. 5. *On the*
in which food is presented to the animal.
hile food in one form possesses little
e, by preparing it in another, its value
creased. Straw cut into chaff, is better
the straw in bulk; steamed well, mixed
sliced roots, better still. Oats and
ey, beans and oil-cake, are all improved
eeding-worth by being bruised. The
ming of hay, and the boiling of roots,
er them also more readily assimilable by
animals to which they are supplied, and
ered more palatable. 6. *On small pro-*
ons of substances with which we may
even be acquainted—The researches in
juices of flesh, shewed the existence
rtain substances greatly influencing its digestibility. Now, as the compounds which play an important part in the digestibility of meat are but small in amount, and if the digestibility is influenced by small quantities of substance, such as Liebig discovered, "is it not likely," asks Dr Voelcker, "that vegetable food may contain small quantities of compounds which exercise a similar influence?" The economical value of food is influenced—1. *By prejudicial substances which food may contain.*—Thus, mustard cake, although rich in feeding constituents, from the quantity of the irritating poisonous essential oil of mustard which it contains, cannot be used as food. 2. *By the mechanical effect the food exercises.*—A case in point is given in bran, which, though highly nutritious, cannot be largely employed as food from the rapidly relaxing effect it has upon the digestive organs. 3. *By the physical condition of the food.*—Musty food, for instance, is prejudicial. 4. *By the flavour which it imparts to the meat or milk.*—While a food may be highly nutrituous, it may, by giving a peculiar and unwished-for flavour, be put quite out of the pale of usable food.

All these points are of the greatest importance to be attended to, and it will, therefore, be of some value to glance, as briefly as may be, at some further considerations bearing upon them. Let us first take up that point under the head, "The bulk of the food as presented to the animal." That the bulk of food is a point of considerable importance is evident, when we consider the physical conformation of the animal we have to deal with—say, the ox. Here the organs are large, capable of containing, and evidently framed to contain, a large mass of food. We may, therefore, predicate that the stomach should be filled and distended. One feeder states that he does not believe in feeding, or in food which does not give this distension; and, therefore, does not approve of giving finely divided food, which he finds does not distend the stomach so well as when food in its natural state is given. But the kind of animal influences this point; for a horse does not require such bulky food as the ox; and it may be, and is, indeed, with some, a q tion whether the cow does not require more bulk of food than a fattening beast. This, obviously, includes considerations relative to the amount or quality of water which may be contained in the food, as well as to the solid substances. And hence, we may, perhaps, be giving matter of surprise to some of our readers, when we state that water by some chemists is not taken at all into account as one of the feeding elements of a food. It goes with them literally for nothing. If so, how comes it that water forms so large a portion of all solid food, and the still more pregnant question, if water can and does sustain life, how comes it that in the science of cattle feeding water is left out of the list of nutritious substances. The following list by Dr Lankester shews, at all events, how important is the part which water plays in the mere physical conformation of food. The figures give the weight of water in every 100 lb. of the following substances:—Potatoes, 75; carrots, 86; turnips, 87; parsnips, 79; mangold-wurtzel, 85; cabbage, 92; flour, 14; barley-meal, 14; oatmeal, 13; Indian meal, 14; rye, 13; peas, 14; rice, 13; beans, 14; bread, 44; cocoa, 4; lentils, 14; buckwheat, 14. Now, with these facts before us shewing how large an element water is in the foods with which we feed our cattle—more abundantly present, be it observed, in those very foods which form the staple of our winter feeding—it is difficult to believe that this element is worthless as a food, or rather, to avoid confusion in terms, as a feeding material or substance. We have used the term water, but the more correct one, we believe, is liquid; for it is exceedingly questionable if the liquid which analysis of a food yields is water—that [illegible] possessing the qualities or ordinary qualities of water as generally met with. It seems to us a much greater probability that the liquid, as a liquid in virtue of having been connected, and that most closely, with other substances in the food, which substances we [illegible] nutritious—has derived from them [illegible] nutritious value itself. It is difficult, we repeat, for any one not prejudiced in favour of one view or another, to believe, that [illegible] the liquid which is so largely present in the food, has no nutritious value. For aught we know, as we have on a former occasion, while discussing this very point, remarked, "the water may be the very substance required to bring the otherwise latent nutritious powers of the other substances into play." Nature does not work at hap-hazard; mere chance has nothing to do with her processes; and we may, therefore, with safety predicate that, as we see water forming a very large part of our fruit and vegetables, this is in reality one of their important constituents. Water may or may not be in itself nutritious, but when in combination with the other substances of food, it may be very different in its constitution; the probability is that it is. There is a subtle something in the constitution of our food which baffles the most delicate analysis to discover; and yet that something may be the very thing which gives to the food its value. We know, for instance, of what a root of kohl-rabi consists. In one specimen we find a certain proportion of water, organic matter, and inorganic matter, and the exact proportions of what these consist; yet, if we take precisely the amount of these, can we, by any cleverness of our own, however aided by chemical knowledge, so unite and combine them that we have a substance of similar nutritive and other value to the original roots. The something which makes the root, with all its characteristics, is wanting, and all our skill cannot call it into existence; the life of the root is not there, and even of what that life is we are totally ignorant. We say that we know what water is, of how many parts of oxygen and hydrogen it is composed; but all we know is, that if combined in certain proportions they form a third substance, which we call water; but how the combination is made we know not. The union of a base with an alkali will form a neutral salt, totally different from either of the bodies of which it is composed; yet how this combination is formed, or why it is, we know not. In like manner, we may maintain the probability that the union of water in a root, with the various substances of which it is composed, brings about that change in the water itself, which makes it nutritious, as it is present in the root. Further, as we know that moisture is necessary to the growth of a plant, and that without its presence the plant cannot assimilate the fertilizing substances in the soil; may we not also predicate that the presence of the water in a root is just what is wanted to bring the nutritive powers of the root into play: without it, is it not just possible that the root, as a feeding material, would not be complete? In the absence of direct proof on either side, may we not say that these things are just as likely to be as they are not to be? Indeed, analogy will lead us to believe that they are. It is, therefore, we think, extremely improbable that water, notoriously forming a large percentage of the bulk of our food, is innutritious, and of no feeding value; and, as a corollary, that the quantity of solid matter in the roots is not altogether the only index to their feeding value. Analysis alone is not competent to define the exact value of water in a root; analysis is often baffled in connexion with our simplest phenomena. We know, for example, that the air of a crowded room is not as healthy as that which fans our cheek as we climb the mountain side; yet analysis has failed to trace an appreciable difference in their constitution. May it not be that the water in a vegetable is a very different thing from water from a rivulet or a spring. At all events, it appears to us that it is not in the true spirit of science to assert broadly that anything is valueless because we wish to assume that it is not. This mode of dealing with difficulties may save us trouble, but it will not enlarge our knowledge. My neighbour may urge upon me his opinion that, on the other side of a wall, there is nothing to be seen, over which he has never looked; but if I climb the wall, I at least am a step further in progress than he. I know, at all events, what he only conjectures, and it may possibly turn out that I open up also a way to "fresh fields and pastures new."

But this statement of some authorities that the water or liquid is not a nutritious element, or at all events not to be taken into account as one, may be viewed from another point altogether, irrespective of the consideration now passed before us, which assumes that the liquid, in virtue of being in contact with other substances, becomes nutritive, or that it increases the nutritive value of other substances—and this other view is a very simple one. Granting that the liquid is nothing more nor less than water pure and simple, we would wish to know why it is discarded as a useless element. It cannot be, for is it not true that water constitutes a highly important element in the maintenance of life? We may carp and quibble at the mere conventional meaning of the word nutritious, but if the object of all food be, as it surely is, to sustain life, then water is nutritious, for, of all substances, it is that which sustains life the longest, and being so, we should much less err in saying that it is the most nutritious of all the substances we give our cattle, than in saying that it is so worthless as a feeding material that it need not be taken into account at all. But this extreme view we, of course, do not wish to put, all that we would contend for is, that it serves no good purpose; rather, indeed, is it calculated to mislead, to say that an element which preponderates so largely in all our foods, especially in our root and leaf crops, is of no practical value as a feeding material, and is therefore to be discarded. In the multiplicity of analyses which have been given of our foods, while the per-centage of liquid or water has been given, and given under the view above named—namely, that it is a useless element, would it not have served some useful purpose had the liquid itself in each case been analysed? Practice sometimes steals a march upon science; we know of more than one case where the liquid from roots—which, under the view we have been discussing, was allowed to run away as useless—was lapped most greedily up by some animals which found accidental access to it. The lessons in these instances were not thrown away by the feeder.

THE RETENTION OF MOISTURE IN ARABLE LAND.

IN last month's issue we gave, under the above head, our remarks on the influence which deep-digging, trenching, or subsoiling, and the fine comminution or division of the soil, had upon its capability or power to retain moisture. We now proceed to point other causes which operate in this direction, the first to which we draw special reference being "frequent tillage and hoeing," as in drilled green crops, during the early summer. These operations are the means of augmenting and retaining moisture in the soil. This coincides very much with the several processes we have already described. The saying has become proverbial, that when it is wished to dry a soil it is turned up to the sun and wind. At certain periods, and with particular descriptions of land, especially if there is a redundance or deficiency of moisture, the popular opinion cannot be gainsayed. In preparing and ridging up light porous soils for turnips during dry weather, the greatest precautions are requisite to prevent the dissipation of moisture. Indeed, we have often been under the necessity of suspending work till the return of rain. Sometimes we have found the delay of a few hours during a sunny drying day in sowing turnips, after the land is ridged up, materially affect the germination of the seed, and even the ultimate weight of the crop. Autumn cultivation and drilling on the *flat* may, in such circumstances, be highly judicious, and if it is necessary to use plough or grubber before sowing turnips, the ground should [illegible] a fortnight's [illegible] repose before drilling. As to drill [illegible] flat opin[illegible] conflic[illegible] [illegible] N. [illegible] moistur[illegible] [illegible] for evaporatio[illegible] [illegible] reminds us of date last [illegible] Spain [illegible] flat. [illegible] him [illegible] that the extended surface caused by the drilling might imbibe more of the air and night dews in a dry climate such as Spain. Our observation warrants us to say that, with a rare exception, we never saw detriment accrue to the crop from hoeing the rows, or horse-hoeing and grubbing the intermediate alleys during drought. We formerly used a small plough instead of a drill grubber or harrow, to pare the turnip drills, as it was called—that is, to cut away a light furrow from each side of the row of turnips before the second course of hand-hoeing was executed. This act of husbandry was invariably followed by a vigorous growth of the plant. It threw up a fresh and renovated surface (more complete in that respect than grubbing or horse-hoeing), to which we attached a considerable value. Now, as we pointed out in our first article, that more moisture was present at all periods in the turnip field than either of the oat fields, we are of opinion that this moisture was due to the absorption of dews by the new surface; for dews play an important part in counteracting the injurious effects of drought. The quantity of water deposited by dew is well illustrated in the dew-supplied drinking ponds in the chalk districts of England, where in many places water cannot be got without going hundreds of feet deep. The ponds are made some 10 yards in diameter, and 5 feet deep. They are puddled by successive layers of clay and chalk. They are first filled with snow, and the water gradually accumulates during spring; and though it as gradually diminishes during summer, the night dews keep up a sufficiency for the flocks. Looking at the problem in all its bearings, however, it cannot be denied that the requirements of the cereals, at that period, must be considerable; and also that rains are largely intercepted in their descent by the straw of the cereal crops, on which the evaporating power of the atmosphere undoubtedly exerts a great influence. This idea occurred to us at the time, and in order o ascertain the point, we tested a pasure-field for moisture, and found that the urnip field still held the largest quantity of water.

To shew the benefit of stirring the soil in great droughts, we give a remarkable example of what occurred in Aberdeenshire, in he memorable dry summer of 1826. Mr Wilson, Lord Blantyre's agent, communicated the story to us, by letter, last month, and he was an eye-witness of the occurrence. Dr Gordon of Auchinchurie, a very intelligent farmer, had a field of turnips sown in the usual way, and made it a point to *hoe three drills with his own hands daily*—that is, the same three drills were daily stirred by the hoe. The result was that the three drills were a good crop, and the rest of the field came almost to nothing. The doctor explained the matter, by saying that by the loosening of the soil freely, air, and especially night air, charged in the driest times with moisture, got ready access, and condensed in the soil.

We are, however, of opinion that the beneficial influences that follow tillage operations may be accounted for on other grounds than have been yet stated—grounds rarely, if ever, adverted to by farmers and writers on agriculture. In periods of drought and heat, an efflorescence appears on the surface of the ground like a light shower of small flakes of snow, and which more especially abounds on the site of a removed dunghill These appearances, chemists inform us, consist of the soluble ingredients of the soil—chiefly the salts of the alkalies, lime, iron, and magnesia. Their formation on the surface is thus explained: the water existing in the soil holds them in solution, and when that water is evaporated and dried up by the sun in a dry time, they are carried to the surface, and, not being æriform (like the water), are left there. Now, the turning down of these substances by tillage or hoeing puts them within reach of the rootlets of the plant, and, being highly soluble, are again melted, and become immediately available as plant food. Hence, the renovated growth visible may be more or less owing to their fertilizing effect. That they again go into solution we made ourselves sure by a careful examination of the soil, under the microscope. This consideration should induce cultivators to re-introduce the paring plough (according to the Scottish plan) in the summer tillage of green crops.

We now come to consider another mode of operating, which exercises an influence upon the retention of moisture on the soil—namely, the "claying of light and loose soils." This is often advantageous in compacting the soil so as to retain moisture. The term clay or clay soil, as we have already remarked, is somewhat indefinite; but most of the earths that go under that name, if at all pulverulent, do benefit a siliceous soil. Many so-called clay soils or earths consist of a very small per-centage of alumina; but as a comparatively small amount of these soil constituents imparts the genuine characteristics of clay to its associated earths—namely, toughness, firmness, and imperviousness—its utility is not to be despised. In our application of clay to light loose soils, we were not successful. The only clay that we could command was too stiff and adhesive, and did not incorporate with the soil. It was a deposit of some depth, cropping out on the top of the old red sandstone, of a red colour, variegated with blue, and looked rich and unctuous, but so indurated that it could not be lifted *in situ*, without being first loosened with a pick. Even the winter's frost did little in disentegrating or breaking it up. Knowing that 134 yards would cover an acre 1 inch deep, and that this quantity would constitute an ample amount as an alterative to our soil, we were much disappointed on finding that its obstinate texture rendered it of little account. We did not thus, however, relinquish the idea of its application in some more available form. We were aware of the fineness of its particles, if by any means they could be separated and wrought down to a powder. Our first essay was to bring it down by agitation in water till it floated as suspended matter, and to apply it in that state to our arable land. In that way we found that it would prove of vast utility, not at all believing the opinion we had formed of it as a basic earth, with a considerable range of affinities, irrespective of its cementitious action in correcting the loose mechanical texture of the soil, so as to preserve the moisture and the fertilizing materials with which it is often associated.

We next draw attention to the operation of "rolling," as one often serviceable in the retention of moisture in dry weather. Cloddy as well as soddy land is frequently a consequence of unskilful management, and sometimes it is owing to untoward weather. The cultivation of land when in an improper condition, as when it is soaking with water, is the cause of clods in almost every kind of soil, especially clay. In spring, the chief use of the roller is to close and flatten the surface of the land in order to preserve the moisture from passing away by evaporation. It is serviceable on clay land for breaking the clods, and on light loose soils for compressing them. Theorists object to the consolidation of the soil by the roller, as, according to the extent of its action, it undoes the loosening and pulverizing effects of previous cultivation; but the depth of the compressing effects of a common one-horse roller does not extend above an inch or two. This, it is believed, does not squeeze ordinary soils injuriously. We have sometimes experienced a loss after rolling a powdery soil laid down with cereals; for when a gale of wind springs up, many of the seeds are uncovered.

We now come to the last part of our subject—namely, irrigation. This, where practicable gives ample water for vegetable growth during [illegible] We have placed this last, [illegible] importance, because over [illegible] arable land it is not [illegible] doubt but that it [illegible] of our [illegible], from [illegible] South [illegible] their [illegible] [illegible] often [illegible] that we could procure a supply from [illegible] that skirted the farm, to refresh and invigorate the parched soil and crops; but that could not be done without incurring an injudicious outlay. There was, however, a low portion of a field where spring water flowed along the boundary ditch, and this we dammed back in protracted droughts. The water was not floated over the ground in hills or furrows, but simply banked back, so that the surface of the water stood 5 or 6 inches below the general level of the ground, and the improvement of the crop, whether grass or corn, was very conspicuous. There is no doubt that dry soils could be injured by too copious watering. A loose sandy soil, with a porous subsoil, cannot withstand heat and drought; but although it has the capacity of drinking up pouring rains as they fall, we have seen its fruitfulness as much impaired by redundant rains as by an arid summer. This must be due to the amplitude and rapid descent of the water through the soil, thereby leeching and wasting the alimentary substances present. The writer's father watered part of a turnip field in the dry summer of 1826 by means of a water-cart. The soil was light and porous, parts of it being a good black mould, capable of resisting all ordinary droughts. The water was only applied, to a limited extent, for a few successive days; but the drills on which the water was poured were not much better than the other parts of the field. At a recent period we tested the same field for moisture in the end of a pretty dry month of June, the field being under turnip culture. There was only 8 per cent. of water present in the soil; and it is probable that there had not been above half that amount in the corresponding period of 1826. If this may be assumed as correct, there is reason to believe that an application of 2 inches would have been requisite to meet the requirements of the crop in that year—or, in other words, 200 tons an acre—a quantity that would be far in excess of what was applied by the water-cart. In another year, when the same field was under oats, which grew to a full average crop, both in respect to bulk of straw and yield of grain, the medium supply of moisture in the soil during May, June, and July was nearly 20 per cent.

ON THE BREEDING AND MANAGEMENT OF CATTLE.

HE following is an abstract ot a paper
read by Mr Duckham, at a meeting of
recon Chamber of Agriculture :—
selecting our breeding animals, it is strict-
cessary that great care and attention be
ised, inasmuch as the condition of the
ny depends more on the sire than on
am.

e following are the several points of per-
n in form—A mellow hide, well covered
soft glossy hair, a moderate short head and
forehead, from which the horns of the
should spring in a straight line, whilst
of the cow have usually a wave and a
t upward tendency; a straight outline, a
leep chest, sloping shoulder, good spring-
ib, so that no hollow remains between the
de of the shoulder and the rib; a deep
, small bone, and the whole carcase well
evenly covered with firm flesh, yielding
a pleasant elasticity to the touch, are
tial qualifications. I consider that too
an affinity of blood is not a desirable
; for although many successful instances
be adduced, yet, as a rule, it should be
ded against.

en, as to their management, I would
that no bull should be used till he is
een months old, and no heifer should
before she is three years old. In my
ion, they should calve at a mature age,
go on breeding as fast as they will after.
r produce will grow into much finer ani-
; besides, there will be no necessity to
extra time after the first calf, therefore
le time may be gained, year by year, with
od breeder.

ppose the heifer should drop her calf in
nonth of September. In order to do this,
must be put to the bull about December,
both are being kept on dry food. In
nonths of spring she is turned out into
pastures, where her milking properties
be greatly developed, owing to the succulent grasses partaken off; those properties not being called into action, the food is converted into fat, injuring her lactile secretions, and even endangering her life when the day of parturition arrives. Having calved, her offspring requires to be treated with great care till the following spring, when he has attained to such a size as to prove troublesome if set at large, Thus, an animal, by being calved at an unnatural season, is, to a great extent, deprived of the genial rays of the sun, and the invigorating and refreshing breeze of the atmosphere, the fond caresses of its dam, and the free exercise of the body; all of which are essentially requisite to him in early life. As for the cow, in order to get milk from her, it is necessary that she should be provided with good, and, therefore, expensive food, and if she continue to breed, the spring pasturage, as before, will fatten her up, and incur great risk at calving, and an imminent hazard of puerperal fever is the result. Upon the principle of gaining a little time annually, I will suppose the heifer intended to calve in autumn should be put with bull about the end of March. Here, again, both are kept on dry dietary, the cow partaking of the summer's grass without any beneficial return, and, like the former, kept during winter upon expensive food, to be the following summer comparatively useless. The calf, too, must be house-fed, and subject to similar unnatural treatment, when the constitution should be substantially laid; but it is never so laid, for however careful breeders may be in their choice, most frequently do we hear of cows and heifers in our best herds becoming sterile, or being given to cast, or becoming early barren, and that they have lost the valuable milking properties of their predecessors — that the bulls have no generative powers, and, therefore, after being reared at a great expense, are of no further value than for the butcher; and it is

not to be wondered at—indeed, it would be wonderful if it were otherwise, when animals have been so treated year after year, generation after generation. It is remarkable that societies and individuals should so long have closed their eyes against the teachings of fact. Autumn is the very worst time a cow can calve in, except, perhaps, it be November. Let us, then, look to the advantages attendant upon a course of action more in accordance with nature's law. The heifer, to calve in April or May, will have to be with the bull in July or early in August, at a period when both animals have been partaking of young and succulent vegetation, which Professor Tanner says is so "favourable to breeding." Being in calf, she can be kept in a most inexpensive way during the winter; as spring advances, and as the day of parturition draws near, her food should be improved, and she should be allowed daily a few hours in the pastures. The young rich juicy grasses will then purify her blood and develop her milking properties. At nights she should be placed in a roomy and well-ventilated building, some weeks or so before calving. Under such treatment, her udder and milk veins will become distended, and the calf, when it makes its appearance, will, no doubt, be a fine one, with plenty of nature's food at hand. After a few days the heifer should be turned into the pastures, where she would find food properly fitted to produce milk; the calf will shortly be able to go into the pastures with her, and then no further care is required till weaning time arrives, when he should be placed in a cot, with a yard to run about at pleasure. Now, consider what that care will be and its effects. In early morn she freely yields him his natural meal, which warms his stomach and prepares it for the feed of grass which he will presently take; and whilst he is enjoying his first meal, her rough tongue will be busy in washing him from top to toe. No portion of his little body will escape her maternal attention. By this means not only is his skin thoroughly cleansed, but it is stimulated by the rough action of the tongue, and a lively circulation of blood throughout the whole body is thereby promoted, as also a luxuriant growth of good hair, which is much desired by all breeders. His meal being ended, he runs and skips about in playful mirth; and thus his vital organs, as well as his every muscle, are brought into healthy action, and the foundation of a robust constitution is early laid. The cow in winter will be cheaply kept in the straw-yard, and whether used for milking, or her offspring be allowed to continue to be reared at her foot, she will yield a good return for the rich pasturage upon which she is placed.

BREEDING AND FEEDING SHEEP

THE following remarks relative to the breeding and feeding of sheep were made in a lecture at [illegible]borne, by Mr J. Sidney Davey, one of the leading agriculturists in that district:—

The breeds of sheep cultivated in this country may be divided according to the character of the fleece—viz., [illegible] wool," "intermediate," and [illegible] probable that all sheep sprang [illegible] type, the great variety we see resulting from food and climate. It is most important that we select our sheep suitable to our soil and climate, and when we have decided on the breed we intend to produce the next business is to get the same, without advising the outlay of extravagant sums, such as are often paid for particular families. It is highly advisable to purchase well-bred stock, and not to pick up the first sheep that are offered for sale, without a knowledge of how they are bred. We run the risk, by such a practice, of starting our flock with a lot of mongrels. There is not the least doubt that we ought to be most particular in regard to blood; for instance, if we have a pure-bred flock, we can cross the breed for ourselves if we wish it, and know what we are about; but if we have a mongrel flock they will breed back, and we can never have an even crop of lambs.

The truth of the matter is, that Leicesters require to d very much like shorthorns, viz., rich land, :uals, and dry climate, and, at the same time, ıe to maturity early, and when slaughtered, ·ell ; but their "fat is fat," and their "lean

ıting my opinion as to what breed is most for this county (Cornwall), I would most y give the preference to shortwool sheep over ɔls, and of the short-wool breed I would select ›pshire Downs.

ler more fully to explain my reasons for comhis decision, I cannot do better than tell you ave treated my own sheep.

then, I am most particular in regard to *'mmetry*, *character*, and *constitution*. I draft .eep myself, and those reserved for breeding .bered from 1 consecutively up to 200, and as :ep is numbered it is entered in the stock book, r particular blood and character. We always heir blood by certain marks. All the ewes ıole punched in the left ear, the wethers in the ır, and the rams half a hole in the right ear ; ıe ewes are drafted they receive a hole in the r, and according to their parentage they have icks on the top and bottom part of their ears ıg their blood. The rams are also marked in .r manner. For 200 ewes I keep four rams, t one ram to a flock of 50. The rams are with a view to correct the defects in the nd the ewes are drawn accordingly ; the result : have exercised good judgment, that we, every nder our flock more even and matchy. I prefer s not to have more than 50 ewes, as there is such as overwork; hence the reason of weak lambs. ewes are served, their numbers are entered into ık, so that the shepherd knows when the yean- e advances, what ewes to pick out to receive a tra food and further attention. I prefer, during ping season, to change the ewes daily ; for in- grass one day and rape another, &c., and by nge of food and the flush of blood they come in lier, and with more regularity. I put the rams e ewes on the first of September, so as to get p of lambs in February. After all the ewes are they are put together into one flock, and al- :o live on the stubbles and eat down stale grass Christmas. If any of the ewes seem to be in :ondition than the rest, they should be drafted ıve a little better food, as it is a great item e them regular in condition, especially for g. They are then removed to a grass field by and allowed during the day to run behind the sheep, and have some pulped food twice a-day. ewes drop their lambs in February, about a ht before their times are out they are brought to r grass field near the homestead, and there have ulped food twice a-day, with rock salt. This ed diet puts them in good heart, gives strength, shes the milk. A small paddock, or "lambing- ɔf two acres, is provided, with a number of sheds 6 feet square ; the ewes are usually placed in their pens a few nights before they lamb, so as to get them accustomed to their new abode. The period of gestation is generally uniform, and averages about twenty-two weeks. After lambing, which I leave entirely to nature, without using any artificial assistance unless in a case of very great need, she is penned in her house with a small trough of pulped food, and a half-pound oilcake, with a little bran and malt screenings, daily. As soon as the ewe has lambed, the shepherd trims any wool that may be around her teats, otherwise a young lamb is apt to make a mistake, and suck the wool instead of the teat ; if it does happen to swallow any, it will immediately cause a stoppage, hence the death of the lamb. The lambs, when ten days old, have their tails amputated at the first joint. After the amputation, the ewes and lambs are then placed in a fresh grass-field, with a temporary lean-to shed from the hedge, for shelter in case of heavy rain. The ewes still have their half-pound of cake per day, from which the lambs benefit, and also the land ; as the lambs advance to eat the cake themselves, lamb hurdles are fixed in one corner of the field where they can reach the cake without the ewes. The ewes and lambs are then folded on rye-grass, and remain on grass, &c., until weaning time. I omitted to make a remark respecting my shepherd. I think that all good men ought to be encouraged, and I consider a good shepherd one of the most, if not *the* most important man a farmer can have on his farm, as he has so much capital entrusted to his care. My plan is this—viz., that if I keep 200 breeding ewes, and get 300 lambs, my shepherd receives £5 ; in fact, he gets 1s. for every lamb he rears above the number of ewes, up to weaning time ; and as all operations, such as tailing, castration, ear marking, &c., take place before the lambs are weaned, they are at the shepherd's risk, which makes him give further attention and have a greater interest. As soon as the lambs are weaned they are all bled in the nose, this I find very beneficial ; they lick and swallow the blood, which acts as an aperient. They are then placed in sheds with an allowance of cake, commencing with from 2 to 4 ounces a day, and gradually increasing the quantity as they grow. The ewes, of course, after the lambs are weaned, are dried off, and milked down once now and then to keep back any hardness or inflammation of the udder ; they, the ewes, are allowed a fortnight or three weeks after weaning to recruit their strength before shearing time, when they are again drafted. The lambs, in the beginning of October, commence their winter career of folding on arable land and pulped food, consisting of turnips, straw, and a little hay chaff. I will now endeavour to explain to you the nature of the pulped food. In the first instance, we will take the reason of folding ; I find that labour is a great item in our expenditure. Every penny ought to be saved. "Thrift" should be the farmer's watch-word, and economy the order of the day. In folding we have this advantage, especially in the off-land, instead of carying all our roots to the homestead to be consumed by beasts, and then carted back again in the shape of manure, which is a deal of manual and horse labour, we consume our crop where it grew, and, in order thereto, have a house of about 10 feet long and 6 feet wide, on wheels which will lock under. This house, which costs about £15, contains one of Hornsby's pulpers, precedes the fold, and is removed daily, or every second day according to circumstances. The roots are pulled, say a month's stock at a time, topped, and placed in convenient heaps, covered with a little straw, and then re-covered with earth to keep them dry, leaving an airhole at the top to allow any superfluous gas to escape. The heaps are placed in rows across the field so as to allow the fold to be shifted at convenient intervals. I prefer pulping to slicing, for the following reasons :—The roots are so intermixed with the chaff that the sheep cannot separate them, and must, therefore, consume a considerable quantity of chaff; hence we can feed with a much smaller quantity of roots, and make the animal eat a much larger quantity of chaff. The crop lasts longer, much more manure is left, and the object for which we grow the crop, viz., the enriching of the land—carried to the greatest advantage. The method pursued is as follows :—The sheep are folded according to sex; the wethers and draft hoggs in one pen, and the hoggs for breeding purposes adjoining, surrounded by netting, which is cheaper than hurdles in this county. The house on wheels is drawn near the heaps of roots, as before mentioned, and for 300 folded sheep, two girls, one at 8d. and the other at 6d. per day, commence pulping the roots in the morning, and store it back with a layer of chaff (consisting of two-thirds straw and one-third hay), and then a layer of pulped roots, with a little malt screenings intermixed. The next morning, when this food is required, instead of giving the sheep a cold frosty turnip, in a frosty morning, on an empty stomach, which is certainly contrary to nature, they have their pulped food, with the juices of the formerly cold turnip absorbed by the naturally dry chaff; and this mixture produces a suitable warm food for the animal, which is readily eaten, evidently with a relish. The sheep fill their bellies quickly, lie down and rest contentedly. They are fed three times a day, viz., seven A.M., twelve noon, and five o'clock P.M., during the winter. The last season having had great difficulty in getting sheep up to weight, I had the pleasure of trying different quantities of artificial food. I divided my wethers into two pens, all feeding on the same quantity and quality of pulped food. To one pen I gave ½ lb. each of artificial food per day, and to the other ¾ lb. per day. The former I had the gratification of selling at fifteen months old, 4 lb. per quarter, at 6½d per lb., without their coats; r 52s. per head. The other lot, at the same time, which had ¾ lb. of cake per day, came in at 31 lb. per quarter; which, at 6½d. per lb., would be s. per head. So it shews that the extra ¼ lb. cake a day will pay well, not only by the increase of weight, but the saving of time and the addition to the quality of the manure. It is now the fashion *not* to have very heavy mutton. My idea is to allow the feeding-sheep ¾ lb. of cake or artificial food per day, and sell them off in March or April, at about twelve months old, without their coats, at 21 lb. per quarter, or with their coats, according to choice, which can be easily accomplished, but of course it requires care and attention, the same as any other business. We chiefly graze our sheep on grass, with a few turnips, and sell them off about Christmas, at from 20 to 22 lbs. per quarter; therefore, time and manure, to a certain extent, are lost. We all know that it is a very important matter to get such suitable artificial food as will assimilate in the animal's stomach. If we give too much of one sort of food it causes a surfeit, and does more harm than good. The great secret in feeding is the occasional change of food, and also cleanliness. I will now endeavour to give you the cost of the folding on pulped food, charging the roots, labour, artificial food, and the hay and straw chaff. In the first place, we take the lambs at the market value, and commence our winter fold :—

Dr.

	£	s.	d.
To 300 lambs at 25s.	£375	0	0
,, Artificial food, ¾lb. a day for 180 days, at 1d. a lb.—11s. 3d. a-head	168	15	0
,, Labour—including one shepherd, two girls, and donkey and cart, at 1s. 6d. per head for six months	22	10	0
,, 1½. cwt. of hay chaff at £3 per ton —4s. 6d. a-head	67	10	0
,, 1½-cwt. of straw chaff at £1 per ton—1s. 6d. a-head	22	10	0
	£656	5	0
Balance for turnips	146	5	0
	£802	10	0

Cr.

	£	s.	d.
By 380 sheep, 21 lb. per quarter, at 6½d. a pound—45s. 6d.... ...	682	10	0
,, 300 fleeces at 8s.	120	0	0
	£802	10	0

Besides the advantage of the sheep's manure to pay for the turnip crop—supposing we allow 12 lb. per head daily, we have consumed 300 tons of roots, which have paid us, independently of the manure, 9s. 9d. per ton; we deduct 9d. per head, or per ton, for casualties, as sheep consume one ton per head in the six months, we have then 9s. per ton for our turnips. There is not the least doubt that if we studied a little more the mixture of foods, we should be thoroughly repaid for our labour. I think that the pulping system is especially valuable this season, owing to the scarcity of the root crops.

A DISCUSSION ON FAT CATTLE.

conditions under which breeding cattle should e fed for show is a subject which regularly p from time to time, the intervals being long according as the genius or humour of practical spurred into activity by glaring cases of de-ion from the abuse of fattening resources. his question has, however, been taken up and ed in earnest, there it ends. This is often the f deliberations which can only end in putting conclusions on paper. There is here no line n be drawn and defined as a certain limit, which no one shall go. It is a question must be left open to the judgment of authorities re accredited with responsibility at the time stocks are brought before them to deliberate in the judging-ring or show-shed. It is question that can be answered by rule, nor nathematical or geometrical nicety, nor by m of weights and measures, but it must be ined by that phase of human judgment which blished by enlightened individual experience lisseminated by tedious repetition till the prin-ecomes general enough to be what is termed onable." As fashions are ever changing, how-ve take courage under this view. It is not ince that so many feet of circumference was red to be a befitting form of ladies' attire, both and abroad. The exact reverse of distension considered to be the pink of perfection or . Stalwart men are, in a mental sense, and in usiness, scarcely less credulous or impressible re the "softer sex"—that is, when they are ed in a manner and by means which they re-or, as the case may be, in a way which they

e reflections were induced by the revival of ject of "cattle feeding" at the annual meeting ek of the Royal Northern Agricultural Society 'Combie in the chair), and the recollection ve of what kind or condition of animal was nable" at our great stock shows ten, fifteen, enty years ago. Mr Marr condemned the system. He urged the propriety of drawing a demarcation in the feeding of cattle for shows. ught no animal above a year old should be l to compete that had received anything but n food—that is, had been fed on grass in the r, and straw and turnips in the winter. Certain might even get too fat for breeding on this; ould, more than anything else, shew their . He thought a resolution carrying out uld have a good effect, inasmuch as many were destroyed by over-feeding. By the system they must either give up showing the animals, or must feed them with artificial food, and he thought that such a resolution as he had hinted at would do much good. Of course he would allow any food to bullocks, as they were intended to be fed. Mr Leslie pointed out the difficulty of the question, and while he agreed with Mr Marr's views in regard to the injury done to stock animals, he would not advise the meeting to enter on a resolution. Mr Campbell fully supported Mr Marr, adding that the line of demarcation was easily drawn, and he could see no difficulty in confining animals to be shewn to the ordinary food of the farm—turnips, straw, and grass. Mr Copeman and the chairman differed with Mr Marr in regard to the expediency of drawing the line, and the effect which would be produced if the line was drawn. Other members expressed their views for and against the line of demarcation, and, as usual, as we have intimated, "the subject then dropped," and in this case apparently without having so much even as any "moral" influence.

Here, then, is this great question raised once more, and brought by discussion to its true bearing, and then dismissed as one with which practical men cannot effectively deal. Scotchmen generally take unto themselves the notion that they are essentially men of practice—that they are not only ready to learn, but that they can carry out any subject or idea which they have mentally mastered. If this be so, how is it that the leading members of the Royal Northern Agricultural Society, after having agreed upon a question, which, in our opinion, is a very simple one, could not embody their sentiments in a resolution which would convey their judgment to the absent members of their own Society, and, "on the wings of the press," to the members of all other societies? This is clearly an admission of the "moral" weakness of a society composed of practical men that ought to have been studiously avoided. The evil is pointed out, understood, and openly acknowledged, and the conclusion is subsequently declared and promulgated that it is irremediable!

All this we could have understood, if it had occurred in connexion with the Royal Agricultural Society of England, about the management of which there has of late been so many and just complaints. But let us take the shows of this Society, and gather up our recollections in regard to the character of animals which were fashionable there only a few years ago, and compare them with those which are looked upon as the first style of fashion now. It is not long since that blubbery and hairless rumps and flabby backs were the only ones that stood any fair chance of being awarded honours by the Society's judges. Milking qualities were thought nothing of whatever; but a "wet nurse" establishment was provided by the Society's stewards, as it was considered to be a necessary institution. We are not attempting to prove by this that the present fashion, as set by the national society, is based on the intelligent or reasonable grounds which are commonly supposed to belong to a society which takes for its motto, "Science with Practice;" but we should be doing both the Society itself and our subject an injustice if we did not freely and candidly admit that the improvement in the fashion which has guided judges of late years has been great, and that its importance has been quite equal to its extent.

This is just the point—How has this improvement been effected? Simply by the outward pressure which has been brought to bear on the council and their stewards and judges by practical men. A few fussy, fanciful breeders, and their amateur friends, merged into a coterie that became compact and nearly all-powerful, and they set the fashion which, even to this day, has inflicted considerable injury on many of our flocks and herds. Their fancies and crotchets, however, might at any time have been likened to a house of cards, for no sooner were they blown upon by the breath of more intelligent men, than they were driven out of form, never to be again raised to prominence. It is the remedy, however, which has to be applied to a course of evil that becomes expensive, and proves the losses inflicted. To this day this expensiveness and these losses are felt: indeed in some cases they have not in the slightest degree decreased. The issue of many animals, both as members of flocks and herds, whose parents have a long pedigree, have to be fed on milk and sugar and every delicacy of the pasture, field, and granary to make them grow to less weight in a given time than more reasonably and naturally-bred issue will grow to on common and comparatively inexpensive food. This result of judging and awarding prizes at shows is, so far, the exact reverse of commercial wisdom. Both the farmer and the consumer wants an increase of lean meat, while nearly the whole tendency of awarding prizes at our principal shows has generally been simply an encouragement to produce a greater disproportion of fat to lean. Hence many flocks and herds have been going the way which the once fashionable Leicesters [illegible] state of degeneracy, which will only produce puny and weak frames that are predisposed to grow much grease and but little muscle. Pigs have gone the same way, and many porcine herds which were once fashionable, are now used up, or seldom heard of.

These data are too well known to need further exposition at our hands, and if the council of our national society had not been what was at the time aptly termed a "close borough," they would have been acknowledged in Hanover Square, and practically asserted in the showyard.

Let the Royal Northern Agricultural Society, and similar practical societies, take courage, therefore, and when they have found the evil and dragged it to the surface, by all means let us have the said evil, and the best possible remedy for it that can be devised, embodied in a resolution. Had the Royal Northern Agricultural Society done justice to itself on the occasion in question, other societies would undoubtedly have followed its example, when an incalculable amount of good would speedily have been effected. If this British privilege—the proposing, seconding, and "carrying" resolutions — was more frequently done by local agricultural societies, when commonly acknowledged errors are made practically conspicuous, glaring faults of judgment and management would soon disappear. Many of the best practical men in the country hold themselves aloof from Royal and country shows. If these men be right, agricultural prizes, as now awarded, must be wrong. These awards are too often a gratification of vanity, and too seldom an award of commercial merit. Let, therefore, real practical societies go on condemning the follies on which we have touched, and let these condemnations be put into a tangible form. If this be done, we shall see as great a change for the better in the character of animals shewn in the next ten years as there has been in the last ten. Even the Royal Agricultural Society may by this time, if it be reformed within, begin to have some appreciation of profit and loss in breeding and feeding animals. Should this much-to-be-desired result ensue, we may then be able to praise its examples as worthy of being followed by local societies, instead of urging local societies to bring their practical knowledge to bear on false and profitless fashions wherever these are to be found.

[illegible] GRANARIES.

THE [illegible] matter [illegible] the treating and storing of grain which in so many things characterized our ancestors "in days gone by," is being gradually done away with, and it is only he who can on the most *economical* plan supply the increasing wants of an increasing population who attracts the public attention, and secures for himself "untold riches," such as even, for very wealth, long-eared Midas would have envied.

Thus it is we every day hear of new patents coming out for this thing and the other thing; whole columns of newspapers being occupied with references to patents, curities for improvements, varying in size from a edle to much larger than an anchor, and this reated, until at last we are fain to ask ourselves the uestion, "When will there be an end of these?"

Competition, lying at the root of all this commotion, as done much to draw out the energies of mankind, ad to place at our disposal ways and means of attaing our object in almost every respect, which otherwise ould have cost us much more labour and toil with far ss results.

Directing our attention to granaries, we see at once hat rapid advances have been made of late in this irection. The ruinous, but ever-present accessories, ich as rats, mice, weevils, &c., hitherto attendant pon a granary, are no longer allowed to feast unmosted, the nicest management and refinements in conomy alone securing a per-centage of profit at all. ractical and successive improvements have every now nd then been introduced, culminating at last in the entilating granary system of Mr Devaux, of which he large granary lately erected at Trieste may be conidered as the type form.

All new granaries have this as the fundamental rinciple upon which they are based, that in order to revent heating and fermentation in large bodies of rain, it is needful that the air have free access to all arts of the mass.

This is ordinarily obtained by turning and tossing he grain by manual labour; in fact, the corn is thrown hrough the air, instead of the latter being forced hrough the corn, as is done in Mr Devaux's granaies.

The chief points in a good granary are as follow: -1. Economy of space, as it is well known that the ost of a granary is almost directly proportional to its ube contents. 2. The substitution of machinery for anual labour. This involves necessary arrangements r receiving, delivering, distributing, and ventilating e grain. 3. Arrangements for storing the corn, so at a current of fresh air may be forced through the rain, thereby arresting at once the further progress of eating and fermentation, or the devastations of eevils. We may, lastly, classify, under the fourth ead, the remaining conditions—that of preventing ffectually the approach of rats and mice, and the duction of fire to a minimum. These conditions are lfilled, in our opinion, in the most perfect manner et known by Mr Devaux's system, a short description f which we will now give.

In size, the building itself occupies the least possible pace, having no floors proper, but passages about 3 et wide, running all round and across it at the baseent level, and at about the level of the top of the ins. The bins are rectangular chambers, from 4 feet o 10 feet square on plan, and from 40 feet to 60 feet igh, according to what is required. The sides are rmed of sheet-iron, closely perforated with small oles, and stiffened with bar-iron and tie-rods. Running p the centre of each bin is a tube about 2 feet in iameter, also of perforated sheet-iron; and between the tube and the outer casing the grain is placed, which is consequently exposed to the air on two sides. Although the grain be in the worst possible condition, all that is necessary is to turn a moderate blast into the centre tube, when the air would push through the perforations right through the body of the grain, escaping ultimately through the perforations in the outer casing. A few hours of this treatment is quite sufficient to restore the worst samples to proper condition, although the heat may have previously generated to such an extent as to render it impossible to keep the hand in contact with the iron bins.

The granary is divided into three blocks, the space allowed in the centre one being 830,000 cubic feet, whilst the two side ones are each 695,000 cubic feet. The bins, 7 ft. 3 in. square, by 42 ft. high, with a centre tube, 1 ft. 9 in. diameter, are grouped in fours, and ranged in rows with a 3 feet passage between. The total number is 486. The grain is delivered in railway waggons, for the accommodation of which there are nineteen docks, at a level of 22 feet above the bottom of the bins. Hoppers are placed between the docks, connected by troughs to seven elevators, which raise the grain to a height of 8 feet above the top of the bins, and shoot it into distributing troughs, nine in number. By the action of 15-inch diameter archimedian screws, the grain is moved along the troughs, the screws being broken in by couplings at short intervals, so that in filling a near bin, the whole length of the screw is not required. Doors are placed in the bottom of the troughs, and shoots provided, each communicating to bins.

Following the course of the grain after having undergone the process of ventilation, we find that at the bottom of each bin a door is placed for the purpose of projecting the grain on to an endless band running beneath the floor. These bands or creepers, of which there are eighteen, carry it to another set of elevators, and by them it is lifted into a hopper placed a little above the delivery staging. Weighing machines are placed under these hoppers, and the remaining portion of the work, such as weighing the grain and tying the sacks, can be finished at leisure.

Such is a brief description of the process patented by Mr Devaux, which, although doubtless imperfect in many of its details, nevertheless has shewn itself to be the only one of real benefit to the public.

We would strongly recommend any one interested in the corn trade generally, whilst in London, to pay a visit to the granary lately erected on this system at Canada Wharf, Rotherhithe; although only about half the size of that at Trieste, it will shew to satisfaction the various processes above described.

The practical success attendant on the processes already patented, gives clear evidence of the latent capabilities of the system, and we will not be surprised if we hear shortly that a step further has been taken towards improvement in this direction, doing away with that waste of power which at present exists to such an extent.

AGRICULTURAL STATISTICS OF 1868.

REPORT TO THE PRIVY COUNCIL.

MY LORDS,—I have the honour to submit to your lordships the agricultural returns of Great Britain for the year 1868, collected, as in the previous year, from all occupiers of land and owners of live stock. The duty of distributing and collecting forms for obtaining the requisite information, and of tabulating the same for counties, was again entrusted to officers of the Inland Revenue Department. The returns for the year 1867 are also printed, in order to afford a comparison of results in the two years.

A summary of the returns, so far as related to the acreage under the chief corn crops, potatoes, and the total number of cattle and sheep, was made up at the earliest practicable date, and sent for publication to the London newspapers upon the 19th of September last.

An earlier announcement of the like results could in future be made, should the forms be sooner returned by the occupiers of land to the collecting officers. As the forms are issued stamped for free transmission by post, a ready means for the early return of the forms by the occupiers is afforded by the Post-office. In many cases where the forms are not so returned, considerable delay is occasioned by the officers having to make personal application at houses situated at some distance from their own residences.

I regret that the returns in details have not been issued earlier, but time is required by this department to complete the grouping into classes of crops, to compute percentage proportions, and for a careful comparison of relative numbers as a test of accuracy. In cases of doubt, inquiries have to be addressed to the local officers in different parts of the country.

With respect to the collection of the returns for the present year, several of the officers employed have reported that the necessary information has been more readily afforded, and that more care has been taken to state the actual acreage and number of live stock.

The practice of entering exact figures in the forms [illegible] occupiers of land will, no doubt, become [illegible] by year, as the object and scope of [illegible] better understood.

[illegible] is reason to believe that the number of live stock in some counties is understated, but probably not to any important extent.

The present is the third year as regards the acreage crops, and the second as regards live stock, for which the returns have been collected in Great Britain [illegible] same period of the year.

In the tables for the present year corrected figures are given for the number of returns obtained from occupiers of land in 1867. As separate returns are made by occupiers having separate farms in two or [illegible] parishes, the number of returns obtained may be considered as nearly representing the number of separate occupations or holdings.

The first two tables shew abstracts of the agricultural returns for each division of the United Kingdom; the figures for Ireland being taken from the returns issued by the Registrar-General in Dublin.

The total number of acres returned as under all kinds of crop, bare fallow, and grass, in the United Kingdom in 1868 was 45,652,000, which is 265,000 in excess of the total in 1867, and 1,307,000 in excess of the total in 1866. The large increase in 1868 as compared with 1866 is, however, chiefly owing to the increased acreage of permanent pasture returned in Great Britain in 1867 and in 1868 under a more comprehensive heading in the forms used for collecting the returns.

Of the total number of 45,652,000 acres returned for the United Kingdom in 1868, 11,659,000 were under corn crops; 4,865,000 under green crops; 984,000 were under bare fallow; 5,690,000 under clover and other rotation grasses; and 22,164,000, or nearly one-half of the total acreage returned, were under permanent pasture.

The proportion of permanent pasture varies considerably in the different divisions of the kingdom. The abstract tables shew that the proportion of permanent pasture to the total acreage returned was 48 in every 100 acres in the United Kingdom—42 in England, 56 in Wales, 23 in Scotland, and 64 in Ireland.

The acreage returned in 1868 as under bare fallow or uncropped arable land amounts to 958,000 acres for Great Britain, and 224,000 acres for Ireland. In Great Britain the proportion of bare fallow to the total acreage returned is 3 in every 100 acres, but it is 5¼ to every 100 acres under corn, green, and rotation grass crops, and 7½ to every 100 acres of corn and green crops only.

There is reason for believing that in parts of Great Britain land capable of cultivation, but lying waste or untilled, is erroneously returned under the heading of "bare fallow or uncropped arable land."

The aggregate acreage under corn and green crops in the United Kingdom in 1868, as compared with 1867, shews the following results:—Corn crops an increase of 227,000 acres, and green crops, exclusive of potatoes, a decrease of 170,000 acres. The acreage under potatoes is larger in 1868 than in 1867 by 84,000 acres, of which 50,000 acres were in Great Britain, and 34,000 in Ireland.

The acreage under wheat is larger in 1868 than in 1867, in each division of the kingdom, the total increase amounting to 310,000 acres.

The acreage under barley in 1868, compared with 1867, shews a falling off in England to the extent of

acres, but as there is an increase of 4000
der barley in Wales and Scotland, and of
cres in Ireland, the actual decrease of acreage
hat crop in the United Kingdom in 1868
to 92,000 acres.

acreage under oats there is an increase in the
Kingdom of 48,000 acres in 1868 over 1867;
f part of the increase, 40,000 acres, occurring
nd; England shewing a decrease of 18,000,
les and Scotland an increase of 24,000

creage under each kind of green crop (except-
toes) is generally lower in each division of the
Kingdom in 1868 than in 1867. The decrease
ingdom in 1868 is 24,000 acres under turnips,
res under mangolds, 12,000 acres under cab-
ohl-rabi, and rape, and as much as 122,000
der vetches, lucerne, &c.

acreage under flax in Great Britain is dis-
ed for the first time in the returns for 1868.
ere under that crop 15,828 acres in England,
Vales, and 1546 in Scotland. The acreage
x in Ireland in 1868 was 206,446.

rked advance is shewn in the number of
d sheep in 1868 over 1867. In the United
n the total increase in cattle amounts to
In Great Britain the increase is as much as
but there is a decrease of 82,000 in Ireland,
unted for by an increase in the exports of
Great Britain.

umber of sheep in the United Kingdom is
1868 than in 1867 by 1,790,000. The
may be said to have occurred exclusively
Britain, the number of sheep in Ireland
scarcely any difference in the two years.

ards pigs, a kind of stock discouraged by the
es of food, there is a decrease in the number
ompared with 1867 to the extent of 1,032,000
nited Kingdom. The chief part of the re-
s in Great Britain, where the number is less
oo. In Ireland there is a decrease of

neral tables exhibit the relative agricultural
of the several counties in England, Wales,
land. In table No. 3, the percentages of corn
the total acreage returned, and the propor-
umber of live stock to every 100 acres under
w variations that may be noticed with local
ral interest.

unties may be arranged with a view to various
ut there are two groups of acknowledged im-
and interest, the grazing and corn-growing
Mr Caird, in his published volume of letters
glish agriculture, gives an outline map of
with a line of division running from north to
distinguish the corn and grazing counties.
this plan, but with some little variation
by the proportion of corn crops to the total
der cultivation, as ascertained by the agri-
turns, the following table has been prepared to shew the chief results of such a division of the English counties.

The counties are arranged, as far as practicable, geographically from north to south. In the two divisions the number of counties is the same, and the total of the acreage returned is not very different. The percentage proportions of corn crops to the total acreage returned in each county are shewn in table No. 3, and it will be observed that in the grazing counties the proportion of corn crops is as low as 10 per cent., and not higher than 33 per cent.; but in the corn-growing counties the proportion of corn crops ranges between 33 and 55 per cent.

As regards the number of the live-stock in the two divisions, it must be recollected that the figures relate to the stock returned as in the possession of the occupiers of land and owners of live-stock upon the 25th of June.

GRAZING COUNTIES.

Northumberland, Cumberland, Durham, Westmoreland, York (North and West Ridings), Lancashire, Cheshire, Derbyshire, Stafford, Leicester, Salop, Worcester, Hereford, Monmouth, Gloucester, Wilts, Dorset, Somerset, Devon, Cornwall.

CORN-GROWING COUNTIES.

York (East Riding), Lincoln, Nottingham, Rutland, Huntingdon, Warwick, Norfolk, Suffolk, Bedford, Bucks, Oxford, Berks, Hampshire, Hertfordshire, Essex, Middlesex, Surrey, Kent, Sussex.

	Grazing Counties.	Corn Counties.
Total acreage returned as under crops, bare fallow, and grass...	12,109,000	10,929,000.
Acreage under wheat.	1,286,000 or 10 per cent. of total acreage.	2,111,000 or 19 per cent. of total acreage.
Acreage under permanent pasturage...	6,363,000 or 52 per cent of total acreage.	3,341,000 or 30 per cent. of total acreage.
Total number of cattle returned	2,484,000 or 66 per cent. of total number in England.	1,295,000 or 34 per cent. of total number in England.
Total number of sheep returned	10,638,000 or 51 per cent. of total number in England.	10,292,000 or 49 per cent. of total number in England.

An increased interest may be taken in returns relating to agriculture of the country if the annual addition to the total number of consumers of food in Great Britain be considered. In round numbers, about 240,000 persons are annually added to the resident population in Great Britain. The additional wheat supply required for that number, at an average of 6 bushels per head, amounts to nearly 180,000 quarters, which, at an average English yield of 28 bushels per acre, represents the produce of upwards of 50,000 acres, and of a much larger acerage at a lower rate of production.

Returns relating to the crops and to the number of live stock in British possessions and foreign countries, so far as can be obtained, will be found at the end of the returns for Great Britain.

Later returns than those published last year have been obligingly furnished by the statistical departments in the respective countries, for Sweden, Prussia, Wurtemburg, France, and some additional particulars have been supplied for Norway and Holland. The returns recently collected in Belgium are not yet complete. Agricultural returns have not as yet been obtained in Switzerland nor Italy; and not for a recent period in Austria, Spain, or Russia. For the United States the particulars published last year are again given, as complete returns for this year have not been, at present, obtained by the agricultural department in that country.

The information received respecting agriculture in foreign countries, stated in English measures, is arranged to afford a comparison of the agricultural resources of this and other nations. Many international interests will be benefited when more exact comparisons can be made of the food-producing capabilities of different countries. Estimate returns can only be considered as affording approximate results.—I have the honour to be, my lords, your lordships' most obedient servant,

A. W. FONBLANQUE.

Statistical Department, Board of Trade,
Whitehall, December 1868.

A HAMBURG PORK-CURING ESTABLISHMENT.

THE well-known pork-curing establishment of the firm of J. D. Koopmann is situated in Kieler Street, leading to St Paul's, one of the suburbs of Hamburg. It has acquired a notoriety, as well for its extremely practical organisation as for the immense quantity of pickled pork with which it supplies the market—a quantity representing the annual slaughter of about 80,000 head of swine. The greater part of this pork is despatched to London in weekly shipments, the amount sent varying of course with the season of the year. During the hot summer months, when fresh meat will not keep so well, the consumption of salted pork increases, and Mr Koopmann thus finds himself called upon to keep pace with an increased demand just at a time when the process of curing is attended with more than usual difficulties. A scrupulous regard to cleanliness and liberal use of ice become then more than ever two of the essentials to success. The pigs cured at this establishment, though bought from armers in Mecklenburg and Schleswig-Holstein, are ll of English breed, and dairy refuse forms their staple ood. The refuse produces, along with a fine, delicate, lean meat, rather a soft flabby fat; and as roasting pork, not fat bacon, is the object in view, a certain mount of caution in feeding with it needs to be bserved. In compliance with the demands of the ondon market, as a rule, only such animals are aughtered as do not exceed 200 lb. live weight. It etimes happens, however, that during winter an eptionally fine pig is killed which would turn the ale at 280 lb. The swine purchased by the firm are ll paid for at so much a pound dead weight, fat and an together; and, in order that no difficulty may be erienced at weighing-time in distinguishing one n's pigs from another's, each carcase is branded with nitials of the owner. Immediately on entering Mr Koopman's slaughtering premises, which are large enough to hold 10,000 head of swine, one's attention is directed to a certain cold, gloomy-looking courtyard, where many hundred specimens of the porcine race are suspended from a beam in uniform rows. Glancing round in another direction, the eye is caught by a multitude of their live brethren being driven into a well-littered pen. Out of this one pig after another is seen to pass through a door into a small enclosure, where a single well-directed blow on the head puts an end to the animal's existence. A few minutes have barely elapsed before the carcase of the slaughtered animal is suspended by a short chain and hook to the iron beam, which runs from end to end of the building at an easy accessible height from the floor. The next operation consists in cutting through the jugular vein and arteries of the neck, and the blood thus liberated flows into a truck, and is carefully preserved for utilization as manure on Mr Koopmann's estate. After being bled, the still warm body of the pig is pushed forward on the bar, unhooked from the chain, and removed by means of a crane to the singeing oven, where it remains a few minutes exposed to a glowing white heat. The rough dirt and singed hair which still adhere to the carcase are scraped off by hand, and the pig then passes to a man whose duty consists in slitting open the belly, clearing out the entrails and detaching the caul. That accomplished, the breast, and, on removal of heart, lungs, &c., also the back-bone, require to be sawn through from end to end, and the head is then severed from the trunk. In this branch of the establishment division of labour is carried so far that each man through whose hand the carcase passes is expected to confine himself to one single cut or stroke, and it may therefore be imagined with what dexterity itude the different operations are performed. sides, into which the carcase has been re- sawing the back-bone down its centre, are the ions of the pig which enter the curing-house. l, when not disposed of to some restaurant inds its way, along with the trotters, to the ufacturer, and the intestines, belly, milt, lungs, rt meet with a ready sale as material for . Every particle or fat adhering to the caul and s, and more especially that fine white portion urrounds the kidneys, is carefully detached, r being rendered down in boilers, is poured e casks and allowed to stand. To purify it her, the melting down and settling processes o be repeated several times, and the final pro- lected in bladders, is sold as lard. When all the been strained off, the coarser, less valuable rated by pressure, is packed in casks, and mains in the press in the form of cakes— greaves—possesses a marketable value as

The immense vault used as a curing house, the sides have been removed, is kept, by f ice in an adjoining cellar, at a constant ure of 3 deg. Reaumur (about 39 deg. Fahr). ing dipped in a strong solution of pickle, the sides are placed on a block, and thoroughly rubbed with Luneburg salt. Covered each with a thick layer of this salt, they are then piled upon one another in huge heaps, and allowed to remain so until the salt has penetrated through the entire mass. On account, however, of the unequal distribution of fat and lean on the hams and belly, a complete uniform salting of the sides is rarely attainable. Two or three weeks, occasionally even a month, must elapse before they are in a state to be taken down from the pile, and, in the language of the workmen, "swept off"—*i.e.*, freed from all superfluous salt. The number of days required to convert the living animal into sides, and effect a perfect cure, varies, of course, with the season of the year. Whilst in winter a fortnight generally suffices, in summer, owing to the difficulty of maintaining a low temperature in the curing-house, the transformation often cannot be completed under three weeks. Although, however, the extensive business of the firm assumes in winter somewhat diminished proportions, it is never entirely suspended; and the fact that the number of pigs slaughtered at the Kieler Street establishment at no time averages under ninety a-day, bears testimony to the thriving state of the concern.

GRAIN CROP STATISTICS OF 1868.

detailed abstracts of the agricultural returns, ewing the acreage of lands under crops, bare nd grass, in each county of Great Britain in ve just been issued by the Board of Trade. o certain alterations in the returns for 1867, which may be mentioned that of the extension reage returns to all occupiers in lieu of the ed limitation to occupiers of 5 acres and up- he results of that year could not be compared of the previous years, but the additional in- n collected in 1867 will render it a correct comparison with subsequent years.

eturns for 1868 were published in September, y could be declared still earlier if the occupiers would make an effort to return the forms o the collecting officers.

g into consideration those occupiers of land live stock, as well as occupiers of land only, l number in Great Britain, in 1868, may be d at 520,971—viz., in England, 385,577; 55,283; Scotland, 80,111. For Ireland the was about 600,000.

leading characteristics of the returns for 1868 thus stated:—Of the 59,964,260 statute acres t Britain, 29,955,695 acres were returned rops, bare fallow, and grass, against 29,727,047 1867. The proportions per cent. in each of the two years 1867 and 1868 respectively, under the different heads, were:—31.2 and 31.5 under corn crops, 11.8 and 11.3 under green crops, 3.1 and 3.2 under bare fallow, 13.4 and 13.2 under cover and other grasses under rotation, and 40.3 and 40.5 permanent pasture, exclusive of heath mountain land. In England, of 32,596,397 acres, 23,038,781 acres were under cultivation, against 22,932,356 acres in 1867. The proportional numbers under each head in 1867 and 1868 respectively were:—Corn crops, 32.3 and 32.5; green crops, 11.7 and 11.2; bare fallow, 3.3 and 3.5; clover, &c., 10.8 and 10.3; permanent pasture, 41.6 and 42.1. In Wales, of 4,734,486 acres, 2,503,646 acres were under cultivation, against 2,415,139 in 1867. The proportional numbers per cent. under each head in each of the two years were:—Corn crops, 21.6 and 21.9; green crops, 5.7 and 5.1; bare fallow, 3.6 and 3.4; clover, &c., 12.5 and 13.1; parmanent pasture, 56.6 and 56.5. In Scotland, of its 19,639,377 acres, 4,413,267 acres were under cultivation, against 4,379,552 acres in 1867. The proportions per cent. under the different heads, in each of the years 1867 and 1868, were:—Corn crops, 31.1 and 31.4; green crops, 15.3 and 15.2; bare fallow, 1.9 and 1.7; clover, &c., 27.7 and 28.6; permanent pasture, 24.0 and 23.0. The results for Ireland are thus stated:—Of the total area of 20,322,641 acres, 15,575,270 acres (including 206,446 acres under flax) were under cultivation in 1868; the proportional number of acres under each head closely followed that returned in 1867. The results for the United Kingdom, including the Channel Islands and the Isle of Man, are as follow:—Of a total average of 77,513,585, 45,652,545 acres were under cultivation in 1868, against 45,387,066 in 1867, shewing an excess of 265,479 acres in the year under review. The proportional numbers under each head, in each of the years 1867 and 1868, were:—Corn crops, 25.2 and 25.5; green crops, 10.9 and 10.6; bare fallow, 2.1 and 2.2; clover, &c., 12.5 and 12.5; permanent pasture, 48.6 and 48.6, or nearly one-half of the total acreage returned.

Of 100 acres under corn crops in England, in each of the years 1867 and 1868 respectively, 42.4 and 45.3 acres were wheat, 25.6 and 23.7 were barley or bere, 20.4 and 19.9 were oats, .6 and .5 were rye, 6.7 and 6.7 were beans, and 4.2 and 3.9 were peas. In Wales, out of 100 acres under corn crops in 1867 and 1868 respectively, 47.4 and 46.9 were oats, 28.4 and 27.7 were barley or bere, and 22.4 and 23.8 were wheat. In Scotland, in each of the years 1867 and 1868, out of 100 acres under corn crops, 73.1 and 72.9 were oats, 16.0 and 15.8 were barley or bere, and 8.2 and 9.1 were wheat. In Ireland, out of 100 acres under corn crops in each of the years 1867 and 1868, 78.5 and 77.5 were oats, and 12.4 and 13.1 were wheat. The percentages of acreage are exclusive of hops in Great Britain and flax in Ireland.

The aggregate acreage under corn and green crops in the United Kingdom in 1868, as compared with 1867, shews the following results:—In corn crops there has been an increase of 227,000 acres, and in green crops, exclusive of potatoes, a decrease of 170,000 acres. The acreage under potatoes was larger in 1868 than in 1867 by 84,000, of which 58,000 acres were in Great Britain, and 34,000 in Ireland. In each division of the kingdom the acreage under wheat was larger in 1868 than 1867. The total increase amounted to 310,000 acres. The acreage under barley shews a falling off in England of 112,000 acres; in Wales and Scotland, however, there was an increase of 4000 acres, and in Ireland of 16,000 acres, so that the decrease in the entire kingdom amounted only to 92,000 acres. Under oats there was an increase in the United Kingdom of 48,000 acres; the chief part of the increase, [illegible]0,000 acres, was in Ireland, but Wales and Scotland also shew an increase of 2[illegible] acres; England shows a decrease of [illegible]. Exclusive of potatoes, the acreage under [illegible] generally [illegible] in each division of [illegible] 1868 than [illegible]7. The acreage under [illegible] Britain [illegible]nguished [illegible] the [illegible] 1868 there were under that crop 15,828 acres in England, 169 in Wales, and 1546 in Scotland.

The counties of England in which the greatest proportion of corn crops to total acreage under cultivation was returned in each of the years 1867 and 1868 respectively is shewn by the following percentages:—York (East Riding), 43.8 and 42.5; Lincoln, 42.1 and 42.7; Nottingham, 37.6 and 37.6; Rutland, 33.6 and 33.7; Huntingdon, 48.5 and 49.7; Warwick, 32.8 and 32.7; Northampton, 33.9 and 34.1; Cambridge, 56.3 and 55.4; Norfolk, 43.7 and 44.3; Suffolk, 49.8 and 50.6; Bedford, 46.0 and 47.0; Bucks, 34.4 and 35.0; Oxford, 40.2 and 40.4; Berks, 40.5 and 41.1; Hants, 39.4 and 39.3; Herts, 43.9 and 45.1; Essex, 50.5 and 51.7; Surrey, 35.8 and 35.8; Kent, 33.9 and 34.2; Sussex, 34.6 and 34.6. The number of acres devoted to the important crop of wheat in 1868 was—In Cambridge, 131,550; Devon, 125,495; Essex, 193,175; Hants, 117,852; Kent, 110,720; Lincoln, 307,518; Norfolk, 205,867; Suffolk, 160,167; Sussex, 104,847; Wilts, 103,522; York (East Riding), 123,268; York (W.R.), 109,236.

The two groups which claim most attention are the grazing and the corn-growing counties. In the present return these have been summarized. The total of acreage is not very different.

Thus, the acreage returned in 1868, in grazing counties and in corn counties respectively, was as follows:—Under crops, bare fallow, and grass, 12,109,000 and 10,929,000; under wheat, 1,286,000, or 10 per cent. of total acreage, and 2,111,000, or 19 per cent. of total acreage; under permanent pasture, 6,363,000, or 52 per cent., and 3,341,000, or 30 per cent. of total acreage.

A greater interest in the returns may be taken, if the yearly addition to the total number of consumers in Great Britain be considered. In round numbers about 240,000 are annually added to the population of England, Scotland, and Wales. The wheat supply required for each one is about 6 bushels; this represents the produce of 50,000 acres, and of a much larger acreage at a lower rate of production.

Later returns than those published last year have been furnished of foreign countries. From these returns, the following results may be deduced:—The number of mouths per English statute acre under crops was, in Norway, 3.66; Holland, 2.70; Belgium, 1.95; Wurtemberg, 1.32; Sweden, 1.36; Spain, 1.5; Bavaria, 1.4; Prussia, 1.6; France, .94; United States, .76; and Denmark Proper, .60. In Great Britain the proportional number was 2.63. The estimated average yield of wheat in imperial bushels per acre was—19.83 in Sweden, 17.2 in Norway, 17.13 in Prussia, 20.62 in Holland, 21.35 in Belgium, and 13.89 in France.

THE DESTRUCTIVENESS OF INSECTS.

LET us keep in mind the four states of life through which insects pass—viz., the egg, the larva, the pupa, and the perfect state. The female of the perfect insect having deposited her eggs, they, when hatched, become larvæ, *i.e.*, grubs, caterpillars, or maggots; these feed voraciously and grow rapidly, at times casting their skins. When their period of feeding and growing is completed they become what are called pupæ, which generally are in a mummy-like chrysalis state; after remaining some time in the pupa state they lastly become the perfect insect, *i.e.*, beetles, butterflies, moths, flies, &c.

THE COCKCHAFER BEETLE.

The insects which feed on the grasses of our pasture and meadow are occasionally permitted to become very numerous and destructive. One of the worst of these is the grub of the common cockchafer beetle (Melolontha vulgaris). The female beetle deposits her eggs in the ground, and the grubs remain in a larva state for three years, feeding on the roots of grass, and of corn, and of various vegetables; then emerging from the ground, the perfect beetles carry on the same destructive process on the leaves of trees. This grub is known as the white grub, and in some parts of Ireland as the Connaught grub; its colour is greyish white, except the tail-end, which is blackish; it is generally distended to the utmost with food, and so fat, and the end of its body so curved, that it cannot well crawl, but rolls over on its side. These grubs sometimes destroy whole acres of grass, by undermining, shearing away the roots, and so loosening the turf that it will roll up, as if cut with a turfing spade. At one time they did so much injury to a poor farmer near Norwich, that the court of that city gave him £25! it was stated that he had gathered 80 bushels of the grub. In 1785 many provinces of France were so ravaged by them that a premium was offered by the government for the best mode of destroying them. Fortunately for us, these grubs are picked up and devoured by many creatures, such as rooks and other birds, which actively follow the plough. In one place where the rooks had been extirpated, the farmers were obliged to pay women to follow the plough and perform the labour which the slaughtered birds would have done free of cost. Pigs are fond of these grubs, and poultry thrive well on them, as also on the perfect beetles when they, at the end of spring, come out of their three years' entombment, and take to wing.

THE ANTLER MOTH.

The pasture plants are injured also by the caterpillars of several insects. The antler moth (charœis or noctua graminis) is abundant in Ireland and Scotland, less numerous in England, but general in the mountainous parts of the Continent; its larvæ devour the roots of grasses, and between 1740 and 1750 committed such ravages in parts of Sweden that the meadows were white and dry, as if a fire had passed over them. In 1853 the caterpillars of this moth so infested some districts in Bohemia, that 200 men in four days and a-half collected 23 bushels, or 4,500,000 of them. In 1759 and 1802 the high sheep farms in Tweeddale were so infested by a caterpillar, that spots of a mile square were covered with them, and the grass devoured to the root. The long-legged gnat, the meadow crane-fly (tipula oleracea), or Daddy Longlegs, while in a perfect state is harmless, but when in the larva state is nearly as destructive to the grasses as the cockchafer. Kirby and Spence state—"In Holderness, in the spring of 1813, hundreds of acres of pastures were entirely destroyed by them, being rendered as brown as if they had suffered a three months' drought, and destitute of vegetation, except that of a few thistles. A square foot of the dead turf being dug up, 210 grubs were counted in it; and what furnishes a striking proof of the prolific power of these insects—the next year it was difficult to find a single one. In many parts of England, in Holderness particularly, it cuts off a large proportion of the wheat crops, especially if sown upon clover leas." The larvæ when full grown are of a dull greyish colour, and without feet, and are in the shape of an elongated cylinder; they devour the roots of grasses and different kinds of corn, especially oats; also the green crops and most garden plants. They are especially injurious in the first crop after the breaking up of the grass land, also after beans and clover. In some places this larva is known as "the grub," and the effects of their "grubbing" in the young oat crops are well known to every farmer. The young crop assumes an unhealthy hue. Stephens's "Book of the Farm" says:—"This hue should not be mistaken for the yellowish tint exhibited by the plant when the support derived from the seed is exhausted, and before the rootlets have obtained sufficient hold of the ground to maintain the plant. The grub taint is of a bluish and reddish tint, and many of the plants evidently appear to be dying, and the consequence is that large spaces are left without a plant."

THE WIREWORM.

In the British Isles there are to be found no less than 36 different species of crane-fly, many of them resembling each other in habits and character. Were not there numbers greatly kept in check by the insectivorous birds, and by the parasitic insects, their injuries to the crops would be far greater than they are. In these islands there are upwards of 60 different species of wireworm ; all of these are the larvæ of the elastic beetles, which are commonly known as spring beetles, snap or click beetles, skipjacks. These names are given them because of a peculiar faculty they possess, by which, when they tumble on their backs they can spring up and light on their feet ; while in the act of springing they make a peculiar noise like the click of a spring. These beetles are harmless in the perfect state ; but in the larva state, in which they are said to remain five years, many of them are very destructive, infesting corn fields, pasture land, and root crops in field and garden. Their rapacity is well known, as also their omnivorous character ; there is no vegetable in existence known to be free from their attacks. Wireworms generally have a long, slender, nearly cylindrical body, covered with a tough crust or skin, and are composed of twelve segments fitting closely to each other, and have six feet in pairs on the three segments near the head. One of the most destructive is the larva of the Cataphagus lineatus ; it is entirely of an ochre yellow colour, except the front of the head, which is brown, but for some time after a change of skin it is white ; beneath the tail-end segment there is a fleshy tubercle which acts as a seventh foot ; the whole body is smooth, with a few scattered hairs ; when full-grown it is about seven lines long, and nearly a line in breadth ; the pupa is nearly white, and about three lines in length. The perfect insect is of a brown colour, thickly covered with short pubesence, and is usually found creeping among the herbage or lying at the sides of stones. The female beetle deposits her eggs in the earth, and when hatched the wireworms are so small as scarcely to be visible to the naked eye, but they at once commence their attacks on the crops—corn, grass, roots, or anything in the shape of vegetable produce. Sometimes they ascend in the stem of the plant, eating the succulent part of it, or creeping up the outside and feed on the leaves at night, but they prefer keeping below the soil, and feeding on the roots of plants and the stem just below the surface ; here it is that they do the most injury. Much may be done to check such injuries by hand-picking and by allowing the birds to follow their natural habits of insect hunting, whereby they provide food necessary for themselves and their young ones. In 1838 Mr G. Pearce, of [illegible] Goran, having sown 1½ acre of turnips to replace wheat that had been destroyed by wireworms, set boys to collect the insects at the rate of 1½d. per 100. They collected 18,000: as many as 50 were taken from a single turnip ; thus, at an expense of only £1, 2s. 6d. he saved 1½ acre of turnips, worth £5 or £7, or more, while, as the boys could each collect 600 per day, [illegible] days' employment was provided for them at 9d. per day, which they would not otherwise have had. It is said that in the Norfolk marshes, where the lapwings congregated and bred, the wireworm was formerly unknown, but that since the birds have been destroyed by the sportsmen and the hunters after their eggs, the wireworm is rapidly increasing in numbers and destructiveness. Some of the preceding observations may help us to avoid a common mistake of calling by the name of wireworm such creatures as the centipedes, which are very different from wireworms, both by nature and habit. Centipedes and millipedes are animals which are not classified among the insect tribe. As their names indicate, they have very many feet—never less than twelve pairs. They feed partly on succulent roots, ripe fruit, and decaying vegetable matters. They may be found under decaying wood and under stones, whence they come out at night in search of food. One species, the electrical centipede, common in some localities, is remarkable for having the power of giving out a phosphorescent light as it moves along, which on a dark night is very conspicuous, and often causes the centipede to be mistaken for a glowworm. This centipede sometimes makes its way into the peach, plum, apricot, and other stone fruit when very ripe, and lies coiled up in the little space between the stone and the fruit, much to the disgust of any one who unexpectedly finds such an animal in his mouth. It is from 2½ to 3 inches in length, not more than half to three-quarters of a line in breadth, of a yellow colour, with a reddish brown head, and has 51 to 53 pairs of short legs—a large number, we may think, for one little creature. Yet, it is far outnumbered by a centipede in the Philippine Islands, which has 322 legs.

THE CLOVER WEEVIL.

The clover crop, roots, foliage, flowers, and seed, suffer much from several insects. The purple clover weevil (Alpion africans) sometimes eats every leaf in its progress, leaving only the fibre. When the clover is in flower the female weevil deposits her eggs, and the little maggots feed on the seed. When patches of discoloured or brownish heads appear in a clover field it is a proof that the weevils are at work upon it. In 1800, one grower of clover seed estimated his loss by this insect at more than £5 an acre.

THE FLY OR APHIS.

Peas, beans, and other legumes are subject to much injury from many insects. As they rise over ground whole rows are sometimes cut off without apparent cause. If approached, the weevils fall down, and remain inanimate, so that it is difficult to detect them at work ; but look forward a step or two and see numbers of them eating voraciously. Three successive sowings have been taken off by them. Some years these destroyers abound ; others they are not to be seen in great numbers. When the pea has reached a more advanced stage of growth, the larvæ of a fly feeds on the pulp of the leaf, causing on it brown spots. When the pulse are in pod other weevils

:heir eggs, one in each pea, &c., in which,
ıtched, each maggot consumes, by degrees,
ıside, so that in spring the husk only remains.
hat little husk has existed the egg, larva, pupa,
ect insect, and in its due time this last pierces
the husk, and comes forth a beetle, to prepare
enewal of its species. The bean, pea, hop,
ckle, rose, and many other plants are great
from a multitudinous tribe of little insects
remarkable for many peculiarities; these are
ides, or plant lice. Some are of a green
-thence the name green blight; others, as on
ı, are black, thence called the collie. They
ate and multiply in vast numbers on the tender
the under side of leaves, and even on the roots
plants. With their little beak they pierce the
stance of the plant, and drain the juice, which
) go to nourish the plant. The multiplication
little creatures is almost incredible; but some
of them much more so than others. Reaumur
ved of one species, that in five generations one
ıay be the progenitor of 5,904,900,000 de-
ts, and it is supposed that in one year there
twenty generations. One of the many curious
tances connected with the aphides is, that al-
like all insects, the sexes are distinct, it often
; that generation after generation will be pro-
ll females, and without the other sex capable
ducing offspring. At least nine generations
e females have been successively produced
hree months. One colony of the aphis Dianthi
ed to increase for four years, without a single
ıong their number. In the year 1810 the pro-
the pea crop was not much more than the seed
nany farmers turned their swine into the pea
ıot thinking them worth harvesting. This
was caused solely by the aphis, and was uni-
ıroughout the kingdom; so that a sufficient
or the navy could not be obtained. The hop
›ends every year on the presence or absence of
; they are the barometer that indicates the
fall of the hop-growers' wealth, as also a
›f the revenue; the difference in the amount of
hops being often as much as £200,000 per
more or less as the aphis prevails or the con-
In many species there is a pair of tubercles
the extremity of the insect, which exude a
liquid, in a manner analogous to the frothing
ıckoo-spit. The honey-like liquid falls on the
f trees, and is then known by the name of
w. Bees and ants are very fond of honeydew,
be seen in thousands on the trees where it is
t. The bees take it up from the leaves; but
; go to the fountain head, and sip the sweet
ı as it flows from the tubercles.

IE CUCKOO-SPIT AND COTTON BLIGHT.

er tribe of injurious insects allied to the
is the cuckoo-spit or frog-hopper. The
es itself on various plants, sucks their juices through its beak, and then surrounds itself with a mass of froth, within which it passes through its larva and pupa states, and thence it emerges, able to fly, to walk, to leap with an agility which has earned for it the name of frog-hopper. The apple and the pear chermes (scylla), also the American apple blight (coccus), in their larva state, reside not in a mass of froth, but in a mass of cotton, which is composed of a vast number of delicate white filaments, that exude from the body, and assume various forms in different species. Of the so-called American blight, the apple blight, the letters of "Rusticus" say—"In very hot weather you may now and then see this blight on the wing; it has just the look of a bit of cotton, or a downy seed, floating in the air, and is driven by every breath of wind quite as readily. If you catch and examine it, you will find it to be just like the plant lice which infest your rose trees, &c., but it is muffled up with cotton wool. If driven by the wind against the branch of an apple tree, there it will stick and found a colony; the white cotton soon appears in large bunches; branch after branch becomes infected; the tree grows cankery, pines, and dies." To destroy this pest he paints over every patch of white on the apple tree with warm double size. The foliage of the hedges and even of the lofty trees of the forest, the young shoots, the bark, and sap-wood, also the hard, full-grown timber, are subject to many injuries from insects. Some years the leaves of the hawthorn, the oak, &c., are drawn together in nest-like bundles, and the branches are left almost bare of foliage in summer, till a second growth of leaves comes on; this is done by myriads of caterpillars, which, with their threads and webs, bind the leaves and feed on them, and may be seen also hanging by their mouths to their threads from their branches. Wood says—"The injury thus caused to the trees by insects is not confined to the mere loss of the leaves for one season; for it occasions them to draw upon the funds of another, by sending forth premature shoots and making germs unfold that in the ordinary course would not have put forth their foliage till the following year." "The threads with which spiders make their webs are in some respects similar to those which are produced by various caterpillars, and in other respects are exceedingly dissimilar. In both cases the threads are formed from a semi-liquid secretion, which is produced in the internal organs; is forced through minute apertures at the will of the animal, and hardens into a thread as soon as it comes in contact with the air; but while the threads of the caterpillar are double or rather two times fused together throughout their entire length, and proceeding from a tube at the mouth of the caterpillar, the threads of the spider are much more complex, each being formed of a vast number of smaller lines, which are produced from an organ called the spinneret, which is placed at the extremity of the body, so the spider always hangs with its head downward; while lowering itself by means of its line." Some insects are called leaf rollers, some leaf cutters, wood

borers, miners, subcutaneous, &c., from their various habits of working, as the leaf-rolling caterpillars, leaf-cutting bees, wood-boring beetles, &c., subcutaneous larvæ, the carpenter bee, the burying beetles, &c.; some drill holes in leaves, some cut pieces out of leaves, which they carry to form their cells. The saw flies, with their peculiar two-bladed saw, cut grooves in leaves, &c., and deposit their eggs in the grooves; some burrow or mine underground at the roots; some in the leaves, between the two sides of the leaf, in that small thin space, working and feeding on the pulp, as the larvæ of the turnip saw-fly, some bore into the growing timber trees, and there live for years; others bore in the timber employed in our houses, buildings, gates, fences, or made up into furniture; others under water, bore and destroy the timber used in the construction of our ships, dockyards, jetties, piers, as the ship worm.

THE STEM-BORER WEEVIL.

The stem-borer weevil (Rhynchites alliariæ) drills a hole in the young twigs, there deposits an egg, then cuts off the shoot and causes it to fall to the ground. This insect attacks almost every kind of fruit tree; the gardener's grafts are often injured by it. A little beetle (Scolytus destructor), hardly the sixth of an inch in length, has caused the death of hundreds of our finest elms and other trees. The female beetle nibbles a hole in the bark, then cuts a channel between the bark and the outer layer of wood, and along the channel deposits her eggs; when hatched, the larvæ, with wonderful instinct, all start nearly at right angles to the channel, and advance without interfering with each other, each little grub increasing the diameter of its channel in exact proportion to its own growth. In a similar manner the ash-borer (Hylessinus fraxini) is destructive to ash trees. Examples of this may be seen between the loose bark of the wood of palings.

THE PINE BEETLE.

The great pine forests of Germany have had 1,500,000 pine trees killed in one year by a little beetle called the Typographer (Tomicus typographus); the Germans call it the Turk. The Scotch pine black beetle (Hylurgus piniperda) mostly leaves the trunk of the tree untouched, but destroys the young side branches by boring into them and living in the pith. Countless numbers of young shoots, 3 to 1[illegible] inches in length may be seen on the ground after stiff breez[illegible] these beetles have be[illegible] numerous [illegible]

[illegible]

wooc[illegible] maggot that bore[illegible] direction [illegible] times logs of timber [illegible] this insect are sawed up and used in buildings without the discovery of the hidden insects; but in their due time the larvæ become the perfect insects, which make their way out of the wood, to the alarm of the inhabitants of the house. Wood says—"A lady complained to me lately that her kitchen was full of hornets; on investigation it was found that new skirting boards had been inserted, and that the creatures had issued from them, their holes being evidence." On the Continent many insects are more destructive than in our islands; as many as 80,000 bark-boring beetles have been found in a single tree. The bark-borer of the oak (Scolytus pygmæus) so abounded some years ago in the Bois de Vincennes, near Paris, that 40,000 trees were killed by it. When in small numbers the bark-borers may do no great injury; but when very numerous they, by interrupting the course of the sap, and admitting wet between the bark and the wood, promote the decay and death of the tree. The housekeeper knows that insects are injurious to woollen garments, blankets, &c., as also to valuable furs; also sugar and sweet juices are consumed by wasps; cheese by other insects; some feed on chocolate, on the spices, in vinegar and in wine, and on corks; the beetles that feed on corks sometimes doing such injury as to necessitate the re-corking of the bottles. Drugs and medicines are not safe; some insects feed on rhubarb, ginger. cayenne pepper, cochineal, or even on the blister-beetle. Ham, bacon, and dried meats have their peculiar insects, and fresh meat of all kinds, poultry, and fish must be guarded from the blow-fly and other insects; flour and meal, bread, cakes, &c., have their peculiar insects, one of which, the meal-worm, remains in its larvæ state two years; hides and skins have been so injured by some species of dermestes in the large skin warehouses in London that the merchants offered £20,000 as a reward for an available remedy. In some countries the number of flies and other insects that enter the house in search of food, or allured by the light, is so great as to spoil the comfort of almost every meal. A great part of our comfort within doors depends upon our apartments being kept clean and neat; but spiders, with their webs, and flies, in various ways, interfere with this comfort, and add much to the business of our servants.

THE LOCUSTS.

The migratory locusts of the hot countries are celebrated in history as widely-dreaded insect destroyers. We remember the account of their devastation in the land of Egypt: "For they covered the face of the whole earth, so that the land was darkened, and they did eat every herb of the land, and all the fruit of the trees which the hail had left, and there remained not any green thing in the trees, or in the herbs of the field, throughout all the land of Egypt." That was about 1491 B.C. We are told that about 200 years before the Christian era, Africa was infested with such myriads of locusts that, after devouring every green thing and flying off to the sea they were drowned, and, being cast on the shore, they emitted a stench greater than would have been produced by the carcases of 100,000 men. St Augustine mentions a plague in that country from the same cause, by which 800,000 persons perished in the kingdom of Massanissa alone.

Africa this plague was occasionally imported ly and Spain. In the Venetian territory, in ore than 30,000 persons are said to have perished nine caused by these insects. In 1650 clouds entered Russia, and passed on to Poland and nia; the air was darkened by them, and they d heaped up to the depth of 4 feet. In 1747 arms did infinite damage in Wallachia, Mol- Hungary, Poland, and in Transylvania. In one of these swarms was seen several hundred s in width; at Vienna the breadth of one of as 3 miles, and extended to so great a length e four hours in passing over the Red Tower. It ened the air that when it flew low one person ot see another at the distance of twenty paces. and Spence also mentioned a large swarm of in the Mahratta country, witnessed by a friend rs; it so hid the sun that no shadow was any object, and some lofty tombs distant not han 200 yards were rendered invisible. In such mbers do the migratory locusts assemble that severe storm, which is always fatal to these a continuous bank of dead locusts has been 3 or 4 feet in height, nearly 50 miles in and exhaling a most pestilential odour from ecomposing bodies. In Southern Africa the of larval locusts are little less to be dreaded eir mature and winged hosts. The following tract from Wood's "Illustrated Natural His- which takes it from Cumming on "Southern ':—"We were standing in the middle of a unlimited length, and about 5 miles across, observed the locusts advancing. On they came, like a snow storm, flying slow and steady, about 100 yards from the ground. I stood looking at them till the air was darkened with their masses, while the plain on which we stood became densely covered with them. Far as my eye could reach, east, west, north, and south, they stretched in one unbroken cloud, and more than an hour had elapsed ere their devastating legions had swept by." Happily for us, the migratory locusts and many other destructive insects of the hot countries do not thrive in the British islands; but there are amongst us more than twenty species of locusts of smaller kinds, all of which go by the common name of grasshoppers. We do not suffer much from them, but in some parts of Europe and America, they are very destructive; a price has been set on their eggs. The city of Marseilles alone in one year paid £48 for their destruction—the price being 5d. per kilogramme for the perfect insects, and 10d. per kilogramme (about 2 lb. avoirdupois) for the eggs. In the *Illustrated London News* of the 19th of September is given, in the words of a settler, a description of a devastation caused by grasshoppers during the present year in the Red River settlement, in British North America:—"In June the grasshoppers come up in swarms of countless millions from the north-west. They would begin upon a field of wheat, barley, oats, or potatoes, and leave it as though it were newly ploughed and harrowed, scarcely a weed being left, or a particle of anything for the use of mankind." Such is the disaster against the effects of which, in the approaching winter, an appeal is made for assistance to preserve the inhabitants from perishing by famine.

THE PITCH LAKE OF TRINIDAD.

Anglo-Colonial, a new magazine, we find the lowing description of the Pitch Lake of Tri-

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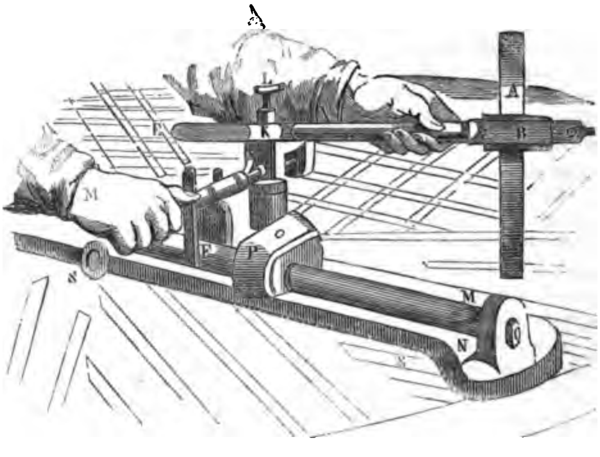
ce through the surface, the traveller finds him- led on a beach which looks as if it had been vn by the Seyssel Asphalte Company. Rocks, nder ordinary circumstances would show them- hite and hard, here present themselves with a d grimy face, and with corners rounded with bony. The shore is black, and underneath er black rocks run out some distance seaward. ound, wherever it peeps out from the green of vegetation which enfolds it, is of the same e; and the people who meet you on shore r all the world as if they had indeed been out of the dust of the earth. The smell of rows stronger and stronger; yet there is no lace from which it can be supposed to arise. rd the prospect is barred by thickets of shrubs and plants, backed by specimens of all the lesser tropical trees. A short distance from the landing-place an opening is perceived in the thicket, and one finds a black rod, roughly cut, and covered with a fine impalpable dust, which has been rubbed off the solid asphalte of the causeway. The road, running eastward, goes inland, and brings the traveller to the lake. There the smell which has so annoyed the explorer's nostrils ever since he sighted La Brea becomes almost overpowering. It may be said to take possession of him, and he will find that no amount of perfumes will suffice to get it out of his senses for hours after quitting the place. This, however, is a minor inconvenience. The spectacle presented by the lake itself is one of the most extraordinary imaginable. In a basin, a mile and a-half in circumference, is a vast collection of pitch, not all liquid, except in the hottest weather, having a blackish grey colour, and a consistency not unlike that of pit coal. It is not lustrous, but dull.

In parts during ordinary weather it is hard enough to resist a good blow, and will easily bear a considerable weight. Indeed, at the borders it is always hard; but on advancing toward the centre it will be seen to bend for some feet around the visitor, and on standing still a watery oil wil be seen to exude from under the boots. It is necessary to keep 'moving on,' for the footing is about as treacherous as that on the Goodwin Sands; still there is not any danger except in the obviously soft places, if the visitor will only keep going. The surface of the lake is dotted all over with numerous islets, composed half of earth, half of bitumen, and covered with the most luxuriant vegetation. Aloes, wild pines, coffee plants, cotton bushes, enormous ferns, and many beautiful flowers deck these little oases in the black Sahara. Humming-birds and butterflies of the most splendid kind take their pastime upon them, and enliven what otherwise would be a sufficiently dreary sight. But these islets depend for their existence upon what one may call the caprice of the lake. They spring up suddenly, soon become clothed with green, and as suddenly as they came they are swallowed up again—plants, flowers, and all—in the insatiable pit. Intersecting the lake in every direction, like so many white veins in its system, are a number of small streams, varying in breadth from 1 foot to 7 feet, and of slight depth. The water flowing in the grooved waterways is perfectly fresh, though tainted with pitch and with a slightly sulphureous taste; it is noticeably clear and bright: and fish—alligators also, it is said—have been found in the channels. What the function of these streams may be in the economy of the lake, whence they come and whether they go, is not readily ascertainable; but it is certain that their united volume would form a rivulet of no mean size. In the months of July, August, and September it is not possible to walk beyond the margin of the lake. The pitch is at that season completely liquid to the depth of an inch all over the surface; and not only is the great bulk of it in a simmering condition, but here and there are strong fountains with forces operating from below, which throw the molten bitumen, mixed with earth and water, to a height of 30 feet into the air. It is during such conditions that the beautiful green islets come to grief, though probably at no time is the lake entirely divested of them. With such a disturbing agency at work, it is perfectly marvellous that there should never have been known an eruption from the lake. That there have been eruptions, the begrimed shore, the dusky road, and the whole of the adjoining country, except Guapa Bay, which is protected by hills, abundantly testify; but within memory the Tartarian lake has been as it is now, disposed at intervals to boil up and to threaten, but never known to boil over. It is possible the secret of this moderation is to be found in the outlets which nature has provided for the superflous energies of the Pitch Lake forces. At about an eighth of a mile from the lake, half-way between Point Rouge and Point Couharil, are pitch springs, and a little to the south-west of Cape La Brea has been seen a vortex, raising the water to a height of 5 or 6 feet, and occasionally covering the surface for a considerable space with a bituminous substance. In the Bay of Mayaro, on the east coast, a similar vortex has been observed; and these, and probably the mud volcanoes of Trinidad—which, by the way, have the same faculty of never overflowing as the Pitch Lake—probably serve as vents to the hidden fires over which the explorer of the southern part of the island has to pick his way. The southern part of Trinidad is literally riddled with holes through which volcanic agencies communicate with the upper world. Besides the places already specially mentioned, M. Levyasse found near the forests of Point Icacque, the Land's End of Trinidad in the south-west, 'a great number of little mounds, about 2 feet high, whose truncated and open-coned tops exhaled a gas smelling like sulphuretted hydrogen. One cone of 6 feet high, on the most elevated part of the hill, continually discharged whitish matter of an aluminous taste; a sound was heard indicating a fluid in a continual state of agitation, and globules of an elastic gas evaporated continually; the scum at the top was cold; four poles, measuring 60 feet, did not touch bottom, and disappeared on being let go.' At this place detonations like distant cannon are heard every year in the month of March. Here is what De Verteul, a native of Trinidad, who published a good book about the island in 1858, says on the subject:—'Bitumen, or fossil pitch, exists in inexhaustible abundance throughout the whole of the southern division. Point La Brea, in the county of St Patrick, is formed altogether of hardened pitch, which extends into the gulf of Paria. The Pitch Lake, with the village of La Brea, in the same locality, is the great natural curiosity of Trinidad, and is really worth visiting. A pond of soft bitumen also exists within the site of the town of San Fernando, and another between Moruga and Guayaguayare. The latter is known by the appellation of 'Lagon Bouf,' from the peculiar noise produced by the bubbling of the soft bitumen. At Oropuche, Guapa, and Quemada, are likewise small craters of the same substance. About two miles from the Yaro, in the spring of the year, a periodical but brief submarine eruption occurs, throwing up quantities of petroleum, with which the beach is afterwards strewn. Many of these bituminous craters exist at the bottom of the gulf along the line of coast from San Fernando to Trois; their eruptions occasionally agitate the waves, and eject considerable quantities of petroleum. The pitch cast upon the beach is generally in the form of lumps or cakes. It is evident to me that our pitch deposits must have a submarine communication with those of El Buen Pastor, in the canton of Muturin.' Precisely so—the volcanic agencies on the mainland are in direct communication with those on the island, which was once part of the mainland. On the mainland, in the province of Cumana, where the geological features identify Trinidad with the continent, and unmistakeably distinguish it from the rest of the West India Islands, are pitchy springs of exactly the same character as those of which mention has been made, and there is reason for thinking that the Pitch Lake is a sort of outlying reservoir, n which a good deal of volcanic energy is harmlessly played off, but which is yet too remote from the great centres of activity to be visibly affected even by earthquakes, which shake hundreds of miles of continental ountry—earthquakes which by spending their force where they do, probably prevent the ebullition in Trinidad of a volcanic violence which would indeed be terrible in its operations. Fancy the basin of the Pitch Lake turned into a discharging crater a mile and a-half in circumference, showering forth tons of boiling pitch mingled with stones and water, upon the beautiful Indian paradise! Humboldt was decidedly of opinion that the various volcanoes of Trinidad were connected under the gulf with the volcanoes on the mainland; and he regarded them as so many safety-valves which allowed free play, and preserved the island from the disasters occasioned elsewhere by confined eruptive forces."

Notes on Farm Implements and Machines.

TOUAILLLON'S AND GOLAY'S PATENT MILLSTONE DRESSING MACHINES.

MILLSTONE dressing machines have created a large amount of attention of late. At the Havre exhibition two were exhibited, which might be said to be representative of the two classes of mechanism—one, that of M. Touaillon, in which the apparatus is worked by hand; the other, that of Golay's, in which it is self-acting. We shall describe these in turn. In fig. 1 we give a perspective view of the apparatus of M. Touaillon, in which a steel chiselled-shaped hammer *a* is [illegible] suppo[illegible] [illegible] this [illegible] [illegible] line to [illegible] ade in the millstone [illegible] simple [illegible] worker [illegible] he h[illegible] [illegible] range of position of the chisel as it cuts is very easily made. The following drawings will more fully explain the construction of this apparatus, which is largely used in France, where, as our readers are aware, "milling" is carried on largely and to great perfection. In fig. 2 we give part plan, in fig. 3 part side, and in fig. 4 end elevation of the apparatus. In these, *o* is part of the framing, which supports by the vertical studs *i' i'* the horizontal rod *i i*, along which, and the slide *l l*, the carriage [illegible] *n*, is made to slide as the tool progresses [illegible] surface of the stone to be dressed. The carriage *k k*, *h h*, supports the cross shaft *c d*, to the end of which the shaft *b*, carrying the cutting tool *a*, and the carriage *e*, are [illegible] cutting tool shaft being adjusted [illegible] *g*, and nut *p*, the longitudinal movement of the cutting tool is effected by sliding the carriage *h h*, *k k*, along the shaft *i i;* the transverse movement by the hand lever wheel *n*, at the end of shaft *i*, the



[illegible] Millstone Dresser—Perspective view.

d of which is at *o*. The part *f* is grasped hand of the operator while working itting tool by the other; and the wheel vorked from time to time, as described, to move the screwed end of the shaft

The following is a description of Golay's machine for dressing millstones above alluded to. For the drawings of this we are indebted to *Engineering* for May 1868 (see figs. 5 and 6). The machine is small, compact in arrangement, and easily adjusted to

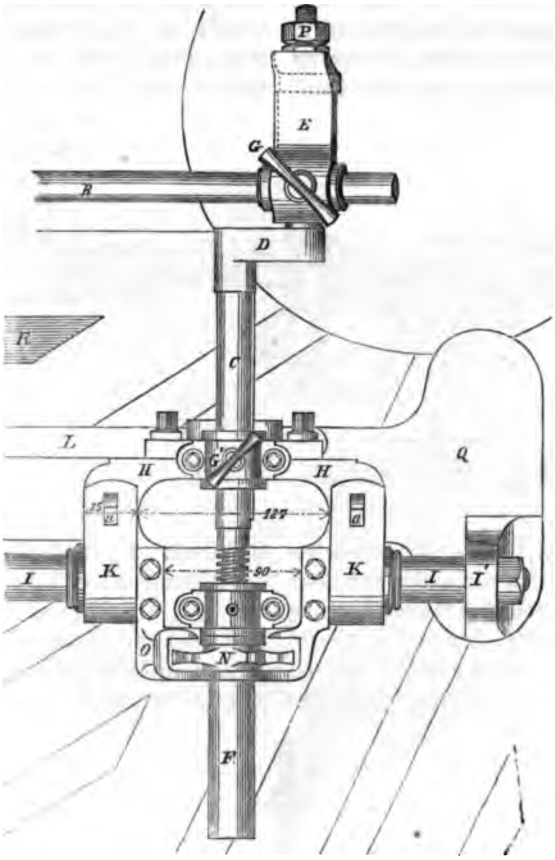


Fig. 2.—Touaillon's Millstone Dresser—Plan.

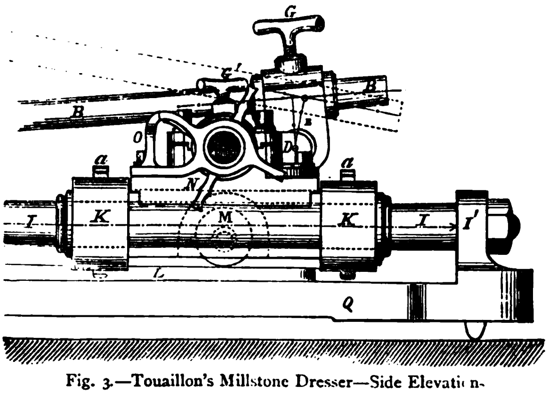


Fig. 3.—Touaillon's Millstone Dresser—Side Elevati n.

the millstone. The lines made in the face of the millstone are cut by means of a Brazilian diamond fixed to a small disc, which has a rapid motion imparted to it. The disc is made up of two discs, screwed on to the axle. On the face of each disc small recesses are cut from the circumference towards the centre, so that when the two discs are placed together, cells are formed opening to its periphery. The diamond is placed in one of the cells, and the discs screwed tightly up, a point projecting from the [illegible] the slope [illegible] connected with a [illegible] socket pillar *c* [illegible] into the end of the axle of the millstone *a a*. Three arms radiate, one of which is shewn at *b*, from this central pillar *c*, providing at their extremities screws *c*, which pass through apertures at the ends of the arms and press upon the face of small plates of iron, resting upon the millstone. By raising or lowering the screws *c*, the frame is levelled as desired. The carriage *g h*, carrying the disc or tool holder *h*, slides out and in towards or from the central pillar *c*, in a dovetailed guide passing along a horizontal arm *f*, connected with the framing, [illegible] adjusted by a bolt passed into [illegible] curved slot in the support. The arm, by this arrangement, can be moved in an arc of a circle, and the tool carrier moved out and in towards the centre and circumference as desired. The upper part of the central

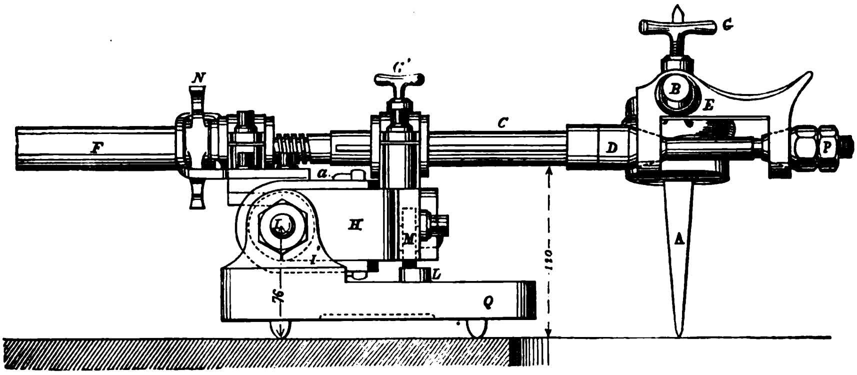
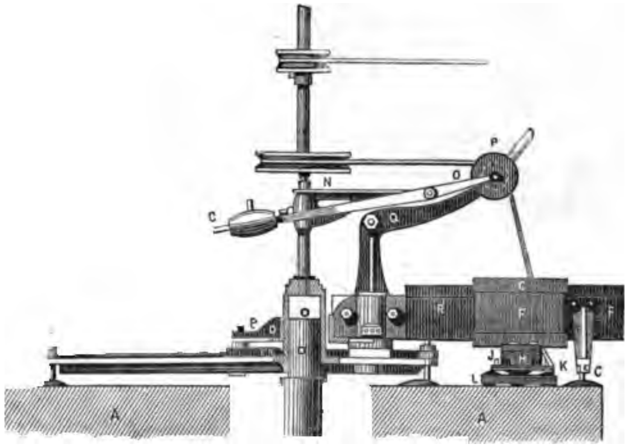


Fig. 4.—Touaillon's Millstone Dresser—End Elevation.



[illegible] View.

: or pillar is formed into a socket or " carrying a small vertical shaft *l*, re- g motion from a small pulley *m*, worked e engine; the vertical shaft carries a *n*, which drives a pulley *p* at the end racket *n*, carried by the central pillar, ocketed in it, to be able freely to move. equired tension is kept on the driving by a counterpoise *p* placed at the end ointed bracket *c*. From the pulley at d of the bracket a belt *l l* passes to the *k* on the axle of the tool holder. The ge carrying the tool holder has the necesnotion along the slide by a bell-crank By the bell-crank lever, the carriage ved along the slide so as to enable the tool to operate in the direction of the line of cut required on the face of the millstone. When it is finished, the tool is moved so as to draw a line parallel to the first, by moving the tool holder in a slide carried by the horizontal arm, and which is placed in a direction at right angles to the slide *f*, which passes from the central pillar *o* towards the circumference of the millstone. The work done by this machine is of a superior kind, and is very quickly performed. Our readers are probably aware that, as a selling patent, it has been successful to a most extraordinary degree, exceedingly large sums having been realized by the sale of licenses.

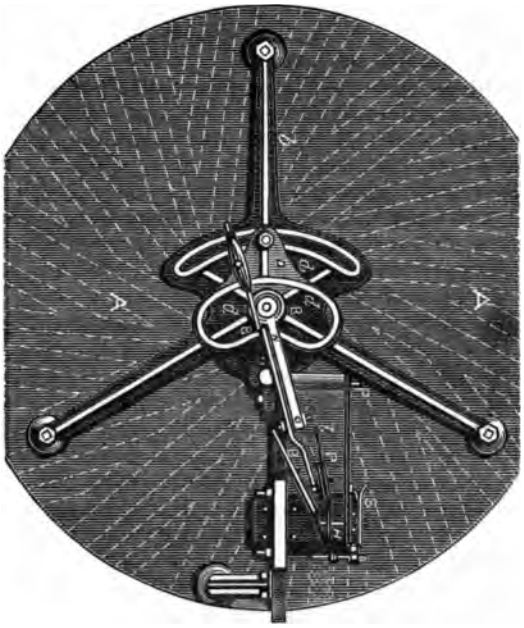


Fig. 6.—Golay's Millstone Dresser—Plan.

THE PLOUGH.

FIRST ARTICLE.

ME have condemned the plough utterly, as an old and effete implement, as perng work the very opposite in character of hich is required, and have discarded it as much as possible from their practice. On the other hand, there are those who praise the plough as the perfection of an implement; that the work it does is not only precisely the kind of work which is wanted, but that it does that work in the best possible way. They look upon it, in fact, as the king of implements, and, as king, it will therefore never die. Much may be said on both sides, and we shrewdly suspect that in this, as in other much disputed questions, the truth lies in the happy line equidistant between the two extremes. Questionless, if we examine a plough in work, and know the work which it is designed to do, it is not possible to do aught else than admire, and admire greatly, the beautiful precision of its operation. In view, indeed, of this—and it is observable in an eminent degree of the fine implements of modern makers—we scarcely can wonder at the enthusiasm with which the plough is considered by many, and at their belief that it will never be superseded. But, on the other hand, we do find that in practice the plough has defects also, which are inherent in it, and which, therefore, can never be remedied by any attempts at alteration in the plough itself. We know, moreover, that there is no other implement save the plough by which the soil can be prepared for the crops which it is to bear; that the soil is, nevertheless, in practice so prepared by implements other than the plough; and that examples of splendidly cultivated fields exist, which for years have not been touched by the plough.

The consequence is, that a vast amount of interest centres round the plough, making everything which ministers to a knowledge of its past history, present position, and future prospects, sought after with avidity and treasured up with care. Hence, we believe we shall be doing our readers a service—as we frankly confess we shall be doing ourselves a pleasure in performing it—if we take up the plough, as the subject of a series of papers to be regularly continued, considering it under the aspects named above. In so considering, it will be necessary to go back to some [illegible] and this retrospect, [illegible] out, we venture [illegible] interesting and [illegible] concern ourselves [illegible] practical details [illegible] that our [illegible] do so, the [illegible] these the [illegible] plough has reached [illegible] copies.

[illegible] was [illegible] countries, or the Netherlands, that we obtained the plough possessed of all its modern features—namely, the sock or share, the coulter, and the mould-board. The plough thus introduced from Flanders was for a long time known as the Rotherham or Dutch plough, and made its first habitat in Lincolnshire, to which it was introduced by the Dutch engineers, who at that period were largely employed in the drainage of these districts.

Possessing, then, all the features of the modern plough, all succeeding improvements made on it consisted merely in giving these features the highest development as regards position and form. This development went on very slowly till a Scottish mechanic, of the name of James Small, took the matter in hand. His patient investigation made the plough the implement which we now see it, a thoroughly efficient one—the work of which could be depended upon as being likely to be done with precision. The use of cast-iron was greatly extended about the period at which Small commenced his investigation into the plough; and the use of this material enabled him to reproduce the most essential part of the plough—namely, the mould-board—so cheaply that it was not worth the while of any mechanic to copy it in *wood*, the material, as may be gathered from the name, in which up to this date the mould-board was made; hence the chances of change in the form decided by Small were lessened, and indeed so much obviated, that the form once introduced remained as the model for succeeding ploughs.

In tracing the practical development of the plough it will be well, at the outset, to describe very briefly the work which it has to perform. In doing this, we shall, of necessity, have to go over ground with which many, if not nearly all our readers are familiar; but those must overlook this, in consideration of the fact that what may be well known to them may be and is by no means well known, if known at all, to others; while even to those who are of the knowing class something may be said, if not directly yet of suggestive practical value, in thus running over the salient features of the work which a modern plough has to perform.

The first work which the plough does is to cut off, or rather partially to cut off, from the earth or soil a slice of a determinate form, generally rectangular, and the second is the turning over of this slice, in such a way that its position is inverted. The side which formed at the beginning of the process the upper surface or side, becomes the lowest or covered up side at the end of it. Strictly speaking these two operations, the cutting off the slice of soil and turning it over, are—at least after the plough has begun work—done simultaneously or *pari passu.* e diagrams in figs. 1 and 2 will better illuste the cutting and turning over of the slice n a lengthened description. Thus, in 1, let the rectangle *a b c d*, generally 10

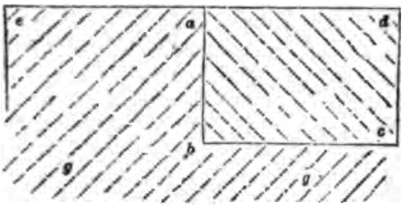


Fig. 1.

hes long by 7 deep in practice, represent the e to be cut from the soil, of which *a b*, being xt the uncut earth, is called the land side, that *c d* the furrow side. The part of the plough ich is known as the "coulter" effects the erance of the slice at the land side, *a b*, mak- a cut more or less vertical, while the "sock" "share" effects the severance of the slice *a b* from the ground in a horizontal direction, This horizontal cut is not completely made, t a part of the slice is left uncut, so as to give oint of leverage, so to speak, to the "mouldard," the office of which is to turn over or ert the slice, as the plough moves along, the e or outer portion of the mould-board being de or formed with a varying curve (of which re hereafter), which curve gives the desired vement to the slice as it slides along and er the surface, till it is finally deposited, on leaving the mould-board, at a determinate gle. The slice cut off from the fixed soil, tically by the coulter, in the direction *a b* . 1), and horizontally by the share *b c*, as it

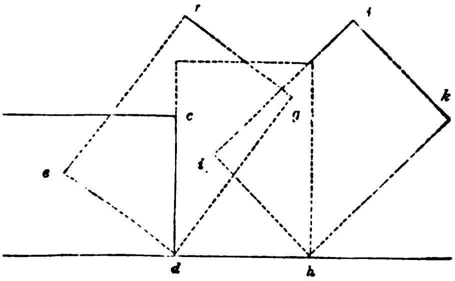


Fig. 2.

ses along the surface of the mould-board, urally assumes a variety of positions before finally placed. A few of those positions are icated in fig. 2. Let *a b c d* represent one e as cut off in its original or rather primary condition, as already described and illustrated in fig. 1; *d e f g* illustrates another position in which it is lifted up by the mould-board, *h c k j* being the final position. Here we find that what was the upper side, *b c*, with its covering of grass in the case of lea, or of stubble, weeds, &c., in the case of corn crop land, is finally the lowest side, *h k*, so that all the weeds, &c., and grass are buried completely; while what was the under side, *a d*, is finally the upper side, or that exposed—or partly exposed—to the atmosphere, the same being the case as regards the end *a b*, which finally is *j k*. The form which the upper surface of the soil assumes when a number of such furrow slices are thus inverted is shewn in fig. 3, *i h* being a line parallel to the line of sole, and running through a point near *k* in fig. 2, and the

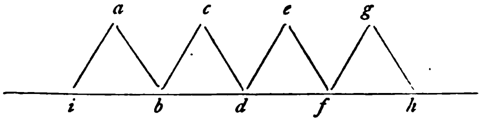


Fig. 3.

upper parts of the slices when laid even in the manner described in fig. 2, from a series of triangular shoulders, as *i a b*, *b c d*, *d e f*, *f g h*, the spaces between being triangular hollows, as *a b c*, *e f g*, into which the seed falls—if broadcasted—and which is covered up by the harrows breaking down and levelling the apices of the triangular shoulders. The angle at which the furrow slice is turned over, or rather at which it lies when finally deposited, is 45 degs., as *i j*, fig. 2, this angle bringing about a very beautiful result—namely, that the angular shoulders, as *b c d*, fig. 3, contain the greatest possible solid contents of earth, and expose the greatest possible extent of surface to the action of the atmosphere and its ameliorating effects in pulverizing it and bringing it to what is called a fine state of "tilth." (The diagram in fig. 3 is not strictly correct, type lines being employed, but the accurate angle is shewn at *j k* in fig. 2). From what we have thus given, we arrive at the definition of the operation of ploughing, which may be thus stated:—Ploughing is the cutting off of a succession of slices from the soil, and laying these over at a determinate angle, generally 45 degs., thereby exposing the greatest possible solid contents of soil, and the greatest possible extent of its surface to the atmosphere; at the same time, covering up the old or original surface, and exposing as new surfaces what were originally covered.

Although the form and adjustment relatively to one another of the various parts of the plough, as the beam, handles, or stilts, the coulter, the sock, or share, &c., demand the greatest exercise of skill and care on the part of agricultural mechanics, it is to the mould-board that the largest amount of attention has been given, as through the medium of this feature the ultimate form and position of the furrow slice is mainly determined; although we shall see as we proceed that by the mode of adjustment or "tempering," as it is technically called, of the coulter and the share, these parts of a plough also exercise a decided and a determinate influence on the ultimate form of the furrow slice. Indeed, it is questionable whether the coulter and the share are not the means by which alone the determinate form is given to the furrow slice, the mould-board merely acting as a more or less influencing medium upon it. Probably the more correct way to put the matter is to say, that all three parts—the coulter, share, and mould-board—influence and decide the determinate and final form of the furrow slice. Nevertheless, such is the influence of the mould-board not merely in the easy going, or otherwise, qualities of the plough, but in the way in which it acts upon the soil, either tending to break it up as it lays it over, or to maintain its form, that the mould-board, as above said, is the feature to which agricultural mechanics have paid the greatest amount of attention. This part of a plough may be defined as "a twisted wedge," or as a "body combining in its conformation the principles of the wedge and the screw." But although the surface is twisted, and apparently to the eye uneven, nevertheless, if a rule is laid across it, it will lie flat on the surface. The presence of any protuberance, or, on the contrary, of a hollow on the surface of a mould-board, will bring about a loss of power in the action of the plough; hence the surface of the mould-board, no matter of what contour, must be absolutely uniform. The great point is to secure a perfect uniformity of pressure upon the slice both transversely and longitudinally, and to lessen the friction of the slice as it passes over the surface of the mould-board, or, more correctly, as the mould-board passes from beneath the slice, by making, as above stated, the mould-board's surface absolutely uniform. In the passage of a plough through the soil, we find that the resistance given to the mould-board arises from—first, the mere weight of the soil pressing upon it; second, the friction of the soil upon the surface of the mould-board; and, third, the resistance which the soil offers to being twisted or torn from the fixed earth, or, in other words, its powers to resist torsion. Each of these resistances acts in its special way, and is very much modified by peculiarities of soil. The mere length of the mould-board, with a determinate twist in its surface, influences very much its action, or rather its powers of resistance to the soil as it passes from under it; the more coincident with the line of draught of the plough the lines of the mould-board which dictate its contour are, and, by consequence, the longer the mould-board, the easier going will be the plough, and the more perfect and unbroken will be the furrow slice which it ultimately leaves. On the other hand, the less coincident the "lines" of the mould-board are with the line of draught of the plough the greater will be the resistance to the plough's action, and the less perfect will be the form of the furrow slice left by it. Thus, while a short mould-board will tend to break up the furrow slice, a long one, other things being equal, will lay it over smooth and unbroken. Again, the form of the contour of the mould-board's surface exercises an influence upon the form of the furrow slice laid over. If the mould-board's surface is "concave," the furrow slice will be rectangular—if "convex," it will be rhomboidal, or what is called "high-crested." As will be seen hereafter, this high-crested form is also influenced, and indeed can be made almost solely, by the action of the coulter and the share adjusted in a peculiar way.

Notes and Queries.

XVIII. VENTILATION OF STABLES.

Note 12, p. 136, we gave a few remarks on this sub-ect, specially with reference to the supply of fresh ıd the appliances by which this can be regulated, ing out the imperative necessity that exists where cy is desired, for having at the same time means ed for supplying fresh air, and for withdrawing or used air, acting in conjunction. We now come ıe points respecting the withdrawal of foul air.

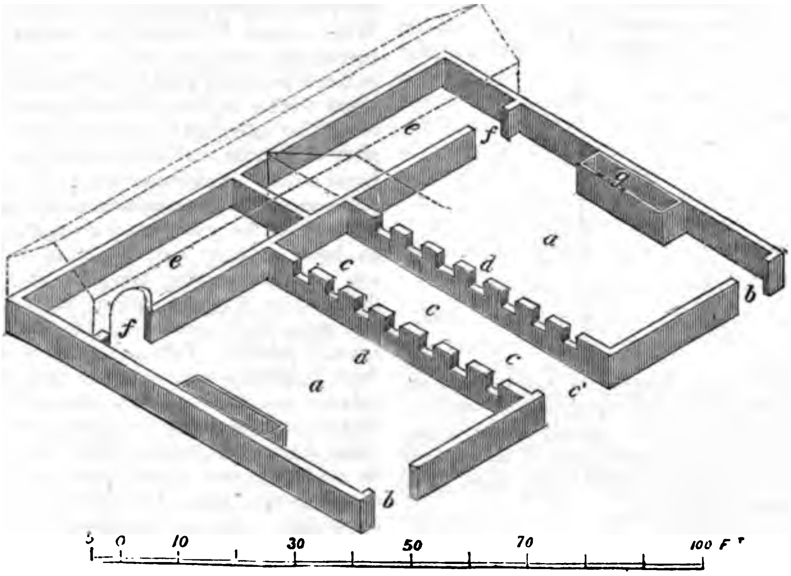


Fig. 1.

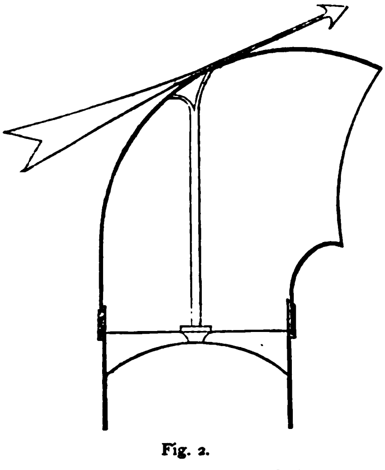


Fig. 2.

There are two modes of doing this, advocated by practical men. First, that which takes advantage of what seems to be the natural tendency which foul air has to ascend, in removing it at the upper part of the building; and second, that which, based upon the fact that carbonic acid gas—which forms a large proportion of breathed air—is heavier than pure air, makes arrangements by which the foul air is withdrawn from the lower part of the building. We will not here enter upon the discussion of these two schemes. We prefer for the present to record our belief that the first is the most natural mode, and that which, when carried out, gives the best results, and that which, moreover, is the easiest and cheapest method. The appliances for the withdrawal of foul air from a building are very numerous, so numerous that notice of a tithe of them would occupy the space of a small treatise; we therefore content ourselves with a notice of one or two of a simple character. In fig. 2, we illustrate what is called the "cowl" ventilation, which, when properly made, so that it can swing freely on its centre, acts very fairly. In fig. 3, we illustrate the form of "cap," designed by the celebrated engineer Tredgold, the special feature of which is the deflecting or angular upper surfaces, which greatly aid the upward current. The wind in passing over these is deflected upwards, and creates a current in the inside of the tube, precisely in the way as a rope passed rapidly through water draws a certain volume of water with it, or a blast of steam or air passing from a jet draws with it a certain volume of the surrounding air. One of these ventilators for foul air is placed on the ridge of the roof of the building, if the roof is an open roof—*i.e.*, without a ceiling.

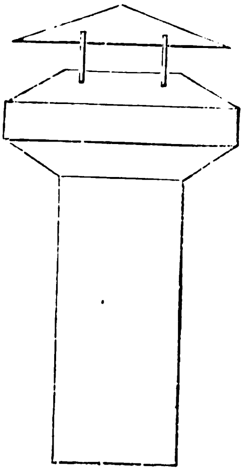


Fig. 3.

But if a ceiling is used, thus leaving a space between it and the roof— a wooden or metal tube or ventiduct should be passed from the opening in the ceiling through the space behind it and the roof, and through the roof itself, and finally finished with a cowl, as in fig. 2, or a cap, as in fig. 3.

XIX. CARE OF FARM IMPLEMENTS AND MACHINES.

We have had repeated occasion to call attention to the generally careless way in which farm implements and machines are exposed in all sorts of places—in open fields, in the corners of farm-yards, &c. Apart from the slovenly habit which this carelessness gives to the men about the farm, there can be no doubt that by it a large loss is secured. The following article in answer to the question in an American paper bears so well upon the subject that we give place to it [illegible]ere :—Does it pay to house and care for farm imple[illegible]ents?—A ques[illegible] [illegible]h all farmers who use and own [illegible] [illegible]ght to be, interested. How [illegible] of [illegible] spend his money freely [illegible] [illegible] implements, whereby much [illegible] the farm is saved, and [illegible] short time they are [illegible] [illegible] [illegible] all wa[illegible] [illegible] such a co[illegible] [illegible] sun shrinks, [illegible] [illegible]s, and damp[illegible] [illegible] leav[illegible] nail[illegible]

ing the tool liable to break, or at all events weaken it. Such tools are disagreeable to work with, and if taken for use, time, which is money, is taken to clean or put them in order before they can well be used. Now, a few moments lost, just as we are going in a hurry into the field, may not, perhaps, be felt much for the present, but when these occurrences are often repeated, in the aggregate they amount to quite a little sum, aside from the extra wear of the implement, and the extra muscle wasted in its use. Let me make my position more clear and familiar by taking this mowing-machine which neighbour R. owns. Some four or five years since he purchased it, paying therefor $125. While using it at first, he was careful to keep the bearing parts well oiled, and the cutter in good order, so that it performed good work ; but in his hurry soon it was trouble for him to clean it, and put it under cover after using it for a day, or after finishing the piece of mowing ; so he unhitches his horses, and leaves it out. At night comes up a rain, and perhaps it lasts several days ; the machine stands out, and when it comes off, he wants it to use again ; some half an hour or more time is taken to clean and put it in fair working trim ; he goes to work—the machine does not perform as well as before, and more time is taken to find and remedy the cause, if possible. Thus matters go on from day to day—the machine wears fast, and soon looks like an old one ; and at the end of five years, after being carefully cleaned and stored, in that capacious store-house where so many implements, stock, &c., find shelter, the machine is used up and thrown aside ; and now another $125 is required to replace the machine, to be similarly used up. Neighbour A. purchased a machine of the same make, and at the same time as R. ; has used it to cut more grass annually than R., and after using, it is carefully cleaned and stored in his tool-house ; the wood-work has been repainted once, and the iron and cutter kept free of rust by cleaning and coating with oil or lard, before being laid away for the season ; and, when to stand over night, and a day or two, it was wiped bright and clean. To-day A.'s machine looks as if it would stand another five years' service, and do it with the same ease and economy as the first service ; all the wood-work and other parts are perfect, except a little natural wear. A.'s machine is always ready for service, without any [illegible]me being wasted in putting it in order before going to [illegible] [illegible]nd when being used, it works much easier than [illegible]ou will see that at the end of ten years A. will [illegible] out $125 for one machine, and a few dollars [illegible] repairs, while R. will have used up two, cost[illegible] [illegible]rom the extra interest, and time in repair[illegible] [illegible]ing his machines in working order, $250. [illegible]o believes that it cost A. $125 for taking a [illegible] of, and in housing his machine for the five [illegible]? No one of sound judgment and of observing [illegible] I opine. What is true of the mowing-machine [illegible] true of all farm implements—carts, waggons, ploughs, harrows, rakes, shovels, hoes, cultivators, need shelter, and an occasional coat of paint ood-work, aside from having their bright iron coated with oil or lard when laid away, and nes after being used to be well cleaned before ut up. Time spent in cleaning and putting place is usually more than saved in looking and putting in order when not thus cared for. ure of the mowing-machines is from real life, ot overdrawn.

PORTION OF BONE TO GROSS WEIGHT OF OX.

average proportion does the bone of the car- well-fed ox bear to its gross weight, after the been removed?—*Agricola.*

XXI. EVAPORATIVE POWERS OF COAL.

ny one of your readers inform me what weight will be necessary to evaporate a pound of a steam-engine boiler?—*A User of a Steam-*

PROPORTION OF GRAIN AND STRAW IN THE CEREALS.

l be glad to know what is the proportion of ous parts of the cereals, as wheat, barley, and nd, at the same time, the proportion which the part of beans bears to the husk?—*W. W. H.*

XXIII. CULTIVATION OF CABBAGES.

have remarked from time to time a good many as to the value of cabbages for dairy cows, oblige me by giving, in an early number, some ns to the method of cultivating the crop? I en recommended to sow the seed for trans- next month: is this tooearly?—*A Farmer.*

WORK DONE BY A THRASHING MACHINE.

Tyro" wishes to know what is the quan- ork done by a thrashing machine, worked by engine.

XXV. THE RAINFALL OF 1868.

amination of the meteorological note published egistrar-General's weekly returns shews that unt of rain which was measured at the Royal tory, Greenwich, in the course of 1868, was 25.2 inches, exactly one inch more than the of twenty-eight years, 1840-67. The late l thus rank as a wet one, contrary to general ion. The uneven distribution of rain was arkable; thus, in the March quarter the rain and this proved to be 1.6 above the average. une quarter the rain was 4.3 inches, and this estored the balance. The following quarter 5.1 inches, the average here being 7.6 inches; ciency, therefore, in the case equalled 2.5 In the December quarter which has just ere has been a superabundance of rain, the of 9.2 inches bringing the entire quantity for up to 25.2 inches, which, as has been stated, ess of a long average. Expressed in another way, it may be stated that the rainfall of 1868 was equal to 2,545 tons for every acre. The census of 1861 gives 37,324,883 as being the number of statute acres in England and Wales, and if the Greenwich notes be accepted as an average for the entire land, then the number of tons that fell in that part of Great Britain would be 94,991,827,235, or 21,278,169,300,640 galls. The estimated population of England and Wales is 21,649,377 for the middle of the past year, so that the rainfall yielded a supply of 982,853 gallons for each person annually. In the month of November the Chelsea, West Middlesex, Southwark, and Vauxhall, Grand Junction, Lambeth, New River, East London, and Kent Waterworks together, supplied on an average 95,500,188 gallons daily; at this rate the store of rain in 1868 would last these eight companies for 610 years. The Greenwich notes shew that there were only five weeks in the past year that were entirely free from rain, but of course in several weeks mention is made of an exceedingly small quantity. It rained on 143 days in 1868—namely, on 48 days in the first quarter, on 21 days in the second, on 26 days in the third, and on 48 days in the last quarter.

XXVI. MOSS ON PERMANENT PASTURE.

What would you advise me to do so that I may destroy moss, or what we generally term *fog*, on a home park? It was drained, limed, and well laid down seven years ago, and is always a good pasture, but the fog is yearly increasing. I don't care about ploughing.—*Mi-ain-nill.*——[Apply about 50 bushels per acre of new slaked hot or caustic lime, spreading it on the surface in the morning of a dry sunny day, and then bush-harrowing the whole. If this is done towards the end of next month, or in March, the sun will then be so powerful as to wither up and destroy the lime-covered moss in a day or two.]

XXVII. A NEW SOURCE OF SULPHATE OF AMMONIA

Monsieur G. Ville, whom the reader will perhaps remember as the author of a work intitled "Crops without Manure," sends an exceedingly interesting communication to the *Journal d'Agriculture Pratique* on the above subject. M. Ville prefaces his note by drawing attention to the source of boracic acid obtained in the waters of the lakes of Tuscany, resulting from volcanic action, or rather that period of volcanic inaction at which they cease to disengage more than merely aqueous vapour—a source so profuse that the acid has been obtained from them in large quantities. M.M. Mascagni and Hoefer were the first to draw attention to this source of boracic acid, and also that the waters yielded a large percentage of sulphate of ammonia. When these discoverers worked, this latter product was in comparatively small demand; but since the extension of scientific agriculture, its importance and uses have greatly advanced. M. Ville here brings his experience to bear upon the belief that from the earliest periods ammonia and the nitrates were probably due to volcanic action, and that they played a most important part in supporting the colossal vegetation of the early stages of the world's history. This belief suggested to M. Ville the study of the aqueous volcanoes as a source of sulphate of ammonia. In the communication above alluded to he says:—"I have set apart the whole month of October for the exploration of the lakes of the province of Volterra, in Tuscany, the waters of which have been used for forty years for the extraction of boracic acid. Provided with all the means of research necessary for the end that I had in view, and placed in the most favourable circumstances for investigating, thanks to the courtesy of the owner of the lagoons, M. le Comte de Larderde, I have dosed upon the place the ammonia contained in the water of the lakes in the primitive or 'mother water'—water which remains after the crystallization of the boracic acid, and in the water of condensation of the vapours which proceed from the natural crevices of the soils and from the openings of the artesian wells. Two results may be deduced from these investigations. The first is, that there is clearly a source of sulphate of ammonia, of great importance, and which is very easily worked. The second is, that if for certain lagoons, the boracic acid is the principal produce, that for others will certainly be the sulphate of ammonia. Here are some figures which will support this double assertion. I have found in 100 parts of boracic acid, the commercial extract of the Lake of Saint Frederic, 1.27 of sulphate of ammonia; then, that the boracic acid of the lagoon of Sasson yielded 22 per cent. In the produce of another lagoon called the *Eaux-vives*, the proportion of the sulphate of ammonia is raised from 48 to 100, while that of the boracic was lowered from 6 to 100. The sulphate of ammonia and the boracic acid are always present together, but according as the proportion of the one increases that of the other diminishes—so much so that I am inclined to believe that by multiplying the borings in the regions of the *Eaux-vives*, we shall find sources of the vapours of sulphate of ammonia richer than ever. I will shew, in support of this supposition, what is produced at the *Eaux-vives*. Abandoned for a long time as yielding liquid very poor in boracic acid, the working of the lagoon has, however, been taken up within a few years back. At the first it furnished, so to say, only sulphate of ammonia. M. le Comte de Larderde has extracted from the waters for exhibition at the Paris exhibition, 1867, double sulphate of ammonia and manganese, of which [illegible] studies [illegible] effects [illegible] working [illegible] the [illegible] the [illegible] [illegible] to [illegible] appropriate [illegible] products. Each [illegible] cubic metres in the [illegible] Comte de Larderde alone; and [illegible] Ville, "by [illegible] the most important results that I have obtained upon the spot, I will soon be in a position to publish the whole of my observations."

XXVIII. TREATMENT OF SEED WHEAT WITH SULPHATE OF COPPER.

The method of preserving seed wheat from destruction by dipping it into a solution of sulphate of copper is recommended and widely used in France. A farmer, writing to the *Journal de l'Agriculture* of Paris, communicates his method of treating the grain, together with an illustration. The apparatus used is very simple, and consists merely of a table placed on two tressles, one of them being 3 or 4 inches higher than the other, thus producing a gentle incline; a border of planks is then nailed to the edges of the table, with an opening in one side at the lower end, to allow of the seed being drawn out when thoroughly saturated. The plank at the lower end of the table is pierced all along its central half with a number of small holes, underneath which is placed an ordinary tub. The tub is nearly filled with the solution of sulphate of copper, in the proportion of 8 lb. of the salt to 7 or 8 gallons of water. The seed corn is put into a two-handled basket, and thoroughly saturated in this solution; the contents of the basket are then turned out upon the table, and the surplus solution allowed to run back through the holes into the tub. When large quantities of the grain are to be steeped, it is, of course, needful to replenish the solution in the tub. A pound of the salt is generally thought to be quite sufficient to saturate 300 times or more its own weight in corn. The various processes effectually prevent any chance of the grain escaping the solution.

XXIX. BOX-FEEDING.

A correspondent (T. H.), in noticing our article on Box-Feeding, says, that he thinks his plan of houses, all timber built and roofed, is more economical as well as equally efficient. "It is erected on oak posts, which are set into the rock, and filled about with brick-bats, old lime, and tar rammed hard. The shed is 60 feet long (it might be 80 with equal advantage), and each side is 15 feet wide, with a passage down the centre of 7 feet. From the centre passage, which is covered with an arch extending over the two side roofs, and open under like a railway shed, there open six boxes on each side, by means of doors opening with pulleys, like windows. This allows of no strain upon the hinges, and is very useful in putting cattle in and out, as you can always pull down the door as soon as the right beast is in the right stand. The passage is boarded on both sides about 5 feet high so that you can see the beasts over it. The hay is in mangers which hook on against the boarding, and the cow draws what is required through an open at the bottom into a box on the inside; beside this is a second box for mashed turnips, &c. These outside hay mangers lift off, giving the whole breadth, 7 feet, of the passage for a cart to ass down, whenever there is occasion to empty he boxes, so that the manure is carted from the box o the field. The boxes are about 10 feet square, so hat on the outside of each towards the eave there is a mall box of 10 feet by 5 feet, which has a door outwards, and which holds a pair of calves or a yearling. The doors of these have openings above, so that a constant current of air goes along the top, inside of the shed, to the open under the arch. This can all be put up with timber (I think the two end walls should be stone, however), and can be put up without any skilled labour more than is usually found on the farm. Your plan has too narrow a passage and more complicated top, and has not the outer calf sheds. Mine is entirely timber, except the two end walls. The pulley doors answer admirably."

XXX. TURNIPY TASTE IN BUTTER.

At this season complaints are very general as to the disagreeable flavour which butter has, arising from the turnips upon which dairy cows are fed. We are of those who believe that this is merely the result of bad management, and that it can be prevented not only by a judicious use of certain kinds of food, but by the way in which those foods are given. This latter is a point often lost sight of, but yet one which is of great practical importance in the feeding of dairy cows. Thus, for example, we have never been troubled with a turnipy taste in the butter, even when feeding largely upon turnips, when we adopted the simple expedient named in the second of the two following letters bearing upon the subject, and which so decidedly corroborates our experience. It is remarkable how quickly milk takes up any flavour after being withdrawn from the cow, and placed in positions in which the substances yielding those flavours are near to it; and it is reasonable to suppose that the same facility for being flavoured exists while the milk is present in the animal organization. Probably, the milk is in a condition more likely to be thus influenced. The following are the letters we have above referred to:—"The following recipe is invaluable in the winter season, when the cattle are fed chiefly upon turnips. Take a piece of saltpetre, about the size of a large pea; put it into the pail before milking. The heat of the milk will dissolve the saltpetre, which will effectually prevent turnip taste in either milk or butter. The following method has been tried with success:—Take a teacupful of sour cream, put it into the cream crock after being properly cleaned; then empty the milk into the crock, on the sop of the sour cream." "About six or seven years ago, I saw it stated in a provincial newspaper, that to feed fat cows with turnips immediately after being milked, and on no account to give them any a short time before milking, prevented the milk or butter from tasting of the turnips. I adopted the hint, and ever since then there has been no occasion to complain of the milk or butter tasting of turnips. The method I pursue is this:—Immediately after being milked in the morning, they get as many turnips as they can eat; during the day they are fed on hay; and, immediately after milking at night, they get the same quantity of turnips. The milk and butter are very much admired by all who take them, both for colour and flavour; and I have often been called upon to give a statement of our system of feeding by visitors. I have several times given the cows turnips a short time before being milked, just to prove the thing. On such occasions the milk and butter tasted strongly of turnips."

XXXI. EXPERIMENTS IN OAT GROWING.

During the past year I made, writes a correspondent, an experiment on oats, the result of which I ask you to publish in your paper, as it may interest many of your readers. In spring I steeped 3 pecks of Scotch barley oats in sulphuric acid, or oil of vitriol, using the proportion of one pint of the acid to a gallon and a-half of water. The seed was sown in a low park, and next a belt of wood, on very poor land. Last week I had the oats thrashed, and I now give you the results, both of the oats that are steeped and what was not. The same quantity of seed was employed in both cases—viz., 3 pecks; and the same quantity of land sown—viz., 30 poles. Oats sown, steeped, 3 pecks; return, 13 bushels; weight, 40 lb.; straw, 25 stone 8 lb. Oats sown, not steeped, 3 pecks; return, 13 bushels 5 lb.; weight, 38 lb.; straw, 19 stone 12 lb. The benefit which sulphuric acid renders to the plant is, that it not only supplies it with the sulphur which every plant requires towards the formation of its growing part, as also that it combines with certain substances, and forms sulphates, which substances form an important portion of the food of plants. I entertain the idea that there are methods by which an increased return may be obtained. The subject is deserving the attention of every farmer in these days when farming is carried on at such expense. I intend this year to make experiments on oats on a larger scale, believing that, from the results I have this year obtained, even against the vicissitudes of season, there is a benefit from steeping oats in the manner I have done.—*A. W. C.*

XXXII. PHORMIUM TENAX—NEW ZEALAND FLAX.

I take the liberty to ask if you or any of your readers can tell me if the Phormium tenax be a hardy plant—viz., if it will stand out in our open pleasure grounds in Norfolk or Suffolk with a little protection in winter? Also, if it requires to be many years old before it blooms? and what is the colour of the bloom?—*C. S.*——[It is quite hardy enough to stand most winters without any protection in Norfolk or Suffolk. It blooms very sparingly in this country, and need not be expected to do so till from six to ten years old. It has greenish white flowers of no great beauty, but the elegant habit and form of its evergreen foliage recommends it as a highly suitable plant in ornamental gardening.]

Our Library Table.

Baildon's Nature-Printed Ferns (*Specimen of*), *prepared according to his new patented process.* By **Henry C. Baildon.** The Descriptions by **Thomas Moore**, F.L.S., Curator of the Chelsea Botanic Garden. London: Lovel Reeve & Co., 1869.

IN a modest preface, Mr Baildon explains the process by which he has obtained the very beautiful plates which make up the Part before us. Its main feature is a modification, or adaptation, of the lithographic transfer-paper process, so largely and successfully used in the arts. Impressions of the fronds, leaves of plants, or other objects, of which facsimiles are required, are taken directly on to the transfer-paper, from which, in the ordinary way, impressions are transferred to lithographic stones, from which the prints are taken. That the process is eminently adapted to the purpose in view, the beautiful plates before us give ample evidence. There is a clearness of outline and a distinctness of venation which is exceedingly satisfactory; and the way in which the delicate filaments of the stems are reproduced is certainly noteworthy. So accurately and perfectly, indeed, are the plants reproduced, that the reader feels as if he was looking upon the veritable natural productions. We beg to refer the reader specially to Plate IV, on which are very fine specimens of what the process can effect in reproducing ferns, and which are further interesting as representing specimens which have not previously been illustrated. These rare ferns are remarkable for their beautiful forms. The letterpress—from the pen of Mr Moore—we need scarcely say, is worthy of the illustrations, and the descriptions are rendered more valuable by the introduction of wood engravings, shewing on an enlarged scale the structure and fructification. These have been most carefully drawn on the wood by Mr Fitch. We sincerely hope that this number will be the first of a long series; and we further venture to express our wish, that those interested in the literature of agriculture, may at some future and [illegible]

[illegible]

[illegible], the peculiarities of the three nationalities [illegible] Englishman is never happy except when [illegible] Irishman [illegible] except when he is fighting, and a Scotchman never at home except when he is abroad"—meets with ample corroboration in the book before us. For it is descriptive of a Settlement which owes its existence, if not entirely, at least mainly, to the development of that characteristic noted above as appertaining to Scotchmen.

The book is well got up, rather profusely illustrated, and contains, as far as we are capable of judging, fairly unprejudiced statements of the capabilities of the province as a field for the settlement of emigrants. And this is saying a good deal, for some emigrant guides which we have read have abounded in such glowing pictures of the places which they described, that the wonder was that, of those who had perused them, any remained in this country—pictures which made us feel half uncomfortable, as if we were foolishly foregoing a splendid chance of what is popularly known as "bettering ourselves." That the physical features of the Province of Otago are fine, that the climate is singularly good, the land fertile, and its products abundant, seems to admit of no doubt. But it is for those who anticipate settling there to consider the "set offs" against all these things, and to decide whether they will "progress," as the Yankees say, faster there than they can do here. To help them to this decision we can confidently recommend the little work before us, and can only express the wish, in conclusion, that those who decide to go will be so fortunate, and so favoured in all they put their hands to, that they will decide to remain.

The Agricultural Labourer (*No.* 2). By **J. Bailey Denton**, Mem. Instit. C.E. London: E. Stanford, Charing Cross. 1s.

IF the agricultural labourer could only know, in all its completeness, what has been said of him and about him, what the advice which has been given him, what his present position is said to be, and what his prospects are of his future, we can conceive of his being surprised, and feeling withal upon the whole gratified that he was so "considerable a man." Truly, he has been the subject of an enormous amount of discussion, of which, we think, it may be safely said that more good would have been done had it been less; had doing something for him been more thought of than mere talking and writing about the same. This, however, does not apply to what has been said of and about the labourer by men such as Mr Denton, who, far removed from that rather numerous body of writers who have written apparently more with the view to make themselves notorious and talked about, than to push forward real improvements in his condition, and who takes up the subject not only with a thorough and perfectly practical knowledge of it, but handles it with a precision, and, what is of more, at least of as much, value, a thorough honesty of treatment that puts what he says in a very different category from that uttered by writers of the class or classes above named. Take, for example, the way in which Mr Denton discusses the "wages question"—after all, that which underlies and influences all the others with which the labourer is connected. We find here the question put in what is only the true way to discuss it, and the reader will rise from the perusal of the chapters with a conviction that the author knows what he is writing about, and how to write about it. He puts the matter very clearly—shews that the labourer is not quite the ill-used man, in the matter of pay, that some make him out to be, and, for obvious enough purposes, would delight to know that he is. Mr B. Denton shews clearly enough—for his facts and figures we refer to the work itself—that the wages of the labourer are not so low as the public have been led to believe; that wages have increased within the last thirty-five years as much as 20 per cent. At the same time, Mr Denton admits that the wages are too low for labour, but proceeds to shew the causes which operate in this direction, and to which we shall presently refer. On the point which some seem to dwell upon with great gusto—namely, that if you can only shew that wages are low in one district, they must be low in all districts, and that wages of inferior men are the wages of the whole class. He says—"It is not right to speak of the wages of inferior labourers, or of those of inferior districts, as the earning of the whole class. Superior hands can always command superior wages, and when they work by the piece, they can obtain with certainty an increase of 25 per cent. over the average wages when paid by the week or the day. With the very wide scope afforded in agriculture for the exercise of intelligence, it is quite in the power of the labouring class to better their position by improving the quality and increasing the quantity of their work, whereby the farmer may be enabled to obtain a greater return from his land, and therefore be better able to pay more to his men. The question is, How is the labourer to qualify himself to do better and more work? Any great improvement can hardly be expected of those who are already in the full exercise of their powers; but with the rising generation it will not be difficult of accomplishment, and in my letter I will do my best to explain the means." Mr Denton then proceeds, as follows, to speak of that which operates more than any other cause in producing inferior labour, and necessarily low wages—"The beer-shop and cider-cellar are truly the great bars to the improvement of the agricultural labourer as we know him at this moment. The influence of drink on an uneducated mind cannot be better shewn than by the fact I have already referred to, that beer or cider will go much farther than their equivalent in money. Where-ever beer is sold in villages it is adulterated, or 'doctored,' as it is termed, by the retailer, if not by, the brewer—

Not good ale nor beer, but very swipes,
To fuddle the head and give the gripes.

Its effects are not measured by its immediate action on the system. It tells equally upon the physical energies of the man as upon the moral powers of his mind. The quality of both beer and cider sold in the lowest wage-paid districts is the worst, and in those counties in the west of England where cider is used instead of beer, the impoverished condition of the agricultural labourer is even worse than where beer prevails. This preference of beer must not, however, be interpreted as proof that it is much better, for it is generally as bad as it can well be. It has that special property so highly esteemed by the brewer of satisfying thirst for the moment, and provoking it afresh directly the beer is swallowed. There is some proof of the injurious influence of excessive drinking, in the fact that in all the worst-paid districts—where labour commands the lowest wages, and where those wages are all that the labour is worth—the publican and beer-seller bear a far larger proportion to the number of agricultural labourers than is the case in those districts where the wages are higher and where the labour is more valuable. We often hear mentioned the low rate of wages in the county of Dorset, and comparisons are made with the wages ruling in other counties. When we turn to the statistics giving the occupation of the people in the population returns of the last census, we find that whereas in Lincolnshire, which I select as the best-cultivated county in England, the number of agricultural labourers is 52,871, and the number of people living by the sale of beer is 1317; in Dorsetshire the number of agricultural labourers is 19,434, and the number of persons selling beer and cider is 582, shewing a proportion in the former case of one beer-seller to 40 agricultural labourers, and in the latter one beer-seller to 33 labourers. The proportion in Lincolnshire is much too high; but what is to be said of Dorsetshire, where the labourers earning only two-thirds of the wages of Lincolnshire, support a larger proportion of beer and cider-sellers? The figures given, moreover, do not fully represent the present state of things as regards the extent to which the beer and cider is drunk in Dorsetshire, as in that county a great deal of cider is given in lieu of money-wages, whereas in Lincolnshire no such regular practice prevails either with respect to beer or cider. The quantity of beer drunk in the hay and corn harvest times is enormous. Able-bodied male labourers will then drink beer which costs from 8d. to 1s. a-day, taking the average of harvests in the eastern corn-growing counties. I should be very sorry to condemn beer as an article of food when properly made with good malt and hops, but that article is seldom to be met with. Yet it cannot long remain so.

With the remission of the malt-tax, which was promised to agriculturists when the corn-laws were repealed, the labourer will again taste good and pure beer; and it is quite within the range of possibility that some ready means will then be discovered whereby the cottager's wife may brew in small quantities as readily as she now makes bread. That such will be the case we may assume from the effect of the repeal of the duty in other commodities. By the reduction of duty on tea, sugar, and groceries, their cost to the poorer classes has been lowered, and their consumption increased at least 50 per cent., and in clothes and shoes an equal benefit has been gained. To the remission of duty on bricks and windows is to be attributed much of the improvement in modern cottages; and we are already seeing the effect of the repeal of the duty on hops, inasmuch as the growth is largely extending all over the country, and lands that were considered to be incapable of producing them are now growing the best. So long as the malt-tax remains an imposition on agricultural industry, and the brewers maintain their monopoly, we shall have bad beer; the mental capabilities of the labourer will be debased, and his physical powers reduced. So long, too, will the cottage home be deserted for the public-house." With the facts of the case, as here put, we thoroughly agree; we are not sure, however, that we agree with the deductions which are drawn from them. We are irresistibly reminded of the proverb, "You may take a horse to the water, but you cannot make him drink." The beer may be bad, but is there a necessity why it should be drunk? The question may seem a silly one, but it is not in reality so, for it involves precisely that principle which underlies the whole question of the improvement of the social habits of the people. We read of efforts made on all sides to raise the habits of the working classes to a higher and nobler platform. Does it not strike one, as, at all events, a fair and reasonable thing to expect, that the working classes should do something to raise themselves. All are not drunken and improvident, and those who are so must see—that is, if they care to look—in their example what sobriety and carefulness do in raising people. These must, and they almost invariably do, tend to help people on in the world. And it appears to us that if drinking does bring bout the inferior labour, and the low wages which Mr Denton maintains that it does, that it is not the andlords and the farmers who should be blamed for hose evils. They originate with, and are supported by the labourers themselves; and although "bad beer" annot in any sense be said to be good, "good beer," taken in excess, will not make things much better. [illegible]s, after all, the habits which have to be removed and [illegible] rid of; and we are of those who maintain that by ar the largest portion of the work which this involves - to be done, and *can only be done*, by the labourers hemselves. Reform in such matters coming from ithout—if, indeed, it can come from without—is [illegible] and [illegible] abiding [illegible] reform, from within that is alone valuable. Enough, and more than enough, has been said as to the raising of the habits of the working-classes by labour exterior to themselves; true it is, and high time that they should be plainly told that they can best raise themselves. The whole subject is one of such importance, and carries with it so many considerations, that we find ourselves drifting into a fuller discussion of it than the occasion of a review permits of. We therefore conclude by drawing the attention of the reader to Mr Denton's chapters upon education, which have a close bearing upon it, and to which we may probably again refer.

Arboriculture; or, a Practical Treatise on Raising and Managing Forest Trees. By JOHN GRIGOR, The Nurseries, Forres. Edinburgh: Edmonston & Douglas. 1868.

A BOOK on trees, by an intelligent and educated nurseryman, who would speak out and tell us all he knows, ought to be a valuable work. No other class of men has such opportunities for acquiring information on the subject; for not only is he, by the very nature of his business, compelled to be constantly handling the living plants, watching their growth, and picking up practical information about them, but he has an amount and variety of material greatly surpassing what any forester or private gentlemen can have; and when, in addition, the nurseryman has a natural love for plants, every requisite for the successful treatment of the subject seems to be united. Such an author Mr Grigor seems to be. He seems to love his trees for their own sakes. He has studied them with the care and attention of one feeling a real interest in them; and the consequence is, that we have here a work of corresponding merit.

One of the points on which we should especially look for original information in a nurseryman's book is the growth of seeds. We are all the more eager for information on this topic, now that the subject of seed adulteration is attracting so much attention, and we much wish that Mr Grigor had told us more regarding the vitality of different seeds, and his experience of seeds transmitted from foreign countries. He gives us some interesting details, but might have given more. If he consulted his books, and shewed the statistics of growth of seeds procured from the same quarter in different years during a continuous succession of years, we are sure that he could furnish our scientific physiologists with some curious points for study. We remember to have heard a nurseryman say, that the crop of silver fir seed was nearly every third year a failure. Is the fact so, or is it not? and if so, is it a general or special incident, and why? Another moot point of more practical interest is, whether seed of foreign species grown in this country or seed from their native country is best for use here. Mr M'Nab maintains that the plants of Abies Douglasii, Picea nobilis, &c., grown from Californian seed, are stronger, and of a more powerful constitution than those raised from the seeds of British grown trees of these species.

Others stoutly maintain the contrary. This is one of the practical points on which Mr Grigor should be able to speak with authority. His opinion seems to accord with that of Mr M'Nab, for he says :—

"Numerous instances of the propagation of the Scots fir from different sources tend, in every way, to establish the fact that this tree, by cultivation for several generations, is very apt to become degenerate; and, as it not only yields cones most abundantly at a low altitude, in a district uncongenial to its best form of development, but also produces them at a much earlier age than in the Highlands, degeneracy is thereby accelerated throughout the country. The natural law of deterioration appears to be somewhat general. The finest variety of wheat obtained from the genial climate of the south, when sown in some of the more favourable parts of North Britain, generally produces a good first crop; but the experience of the agriculturist tells him that the variety changes, and that it is more profitable to renew the stock than to continue to reproduce from the seed of his own growth."

In another instructive passage he tells us that "a succession of unfavourable seasons since 1860 has occasioned a great scarcity of Scotch pine seed, and consequently of young plants of the native tree of this country. This gave rise to large importations of the seed from the continent, from which plants have been grown very extensively throughout Scotland. These plants are utterly worthless, except in the most favourable situations. In the most sheltered nursery ground they seldom survive the second winter without shewing the influence of frost; and, unless protected in early winter, they generally become quite brown by the spring of the year, and unsaleable. This is a fact well-known to Scotch nurserymen, and to many in England, whose nursery grounds stand elevated and exposed. The difference between the plants of the native Scotch pine and continental P. sylvestris is quite perceptible when one year old, but much more so at the age of two years; then, the two sorts brought into view on elevated ground, standing side by side, could readily be distinguished at a mile's distance, so great generally is the contrast in colour; the foreigner has a dead and withered appearance, while the native plant stands green and scathless. Plants from imported seed have also the disadvantage of forming bare roots, and are, on that account, more difficult to transplant in safety; therefore, to treat the plant skilfully, it should be transplanted at the age of one year, which will have the effect of giving it a more fibrous root, and of retarding its upward growth, which has the effect of diminishing the influence of frost to some extent during its nursery management. The upward growth of foreign Scotch fir, however, in good shelter and in a favourable climate, is more rapid than that of the native plant. This is very decided in early life, but their girth is generally less, and, at best, the tree assumes the tall, slender appearance which I have observed conspicuously in the planted pine woods of Germany, even where the trees had ample space. Some young plantations, formed in the Highlands of Scotland with plants from foreign seed, suffered so severely by the summer of 1863, that the succeeding summers have not restored their vigour, while the native plant stood exempt from injury."

It would thus appear that Mr Grigor is quite alive to the advantage of procuring fresh seed not only from the native country of the species, but from that district of its native country which most nearly corresponds with the climate of the region where the seed is to be raised. But in his chapter on acclimatization, as he calls it (which, by the way, is the chapter most open to criticism in his book), he argues in the opposite direction, maintainining that tender species are acclimatized by growing for successive generations in a new land. He quotes Mr Rivers and other authors in support of this, but if he will go over his instances again, we think he will see that they are only instances of *change*, and that those quoted are only in the direction of hardiness, because those which went in the opposite direction have been disregarded or have died off. No one now disputes that new conditions of food, climate, or treatment produce change, and it is by watching these, and breeding in-and-in from the most suitable species, that the breeder succeeds in producing his stronger, hardier, bigger, or more fruitful varieties. We have not space here to discuss the point with him, but we are wholly at issue with him in so far as he maintains that the effect of long continuance of a species in a new country is to impart to it in that country the hardiness or other qualities it possessed in its native habitat. According to our view, there is no such thing as acclimatization in the sense in which he uses the term.

With regard to the change in the Scotch fir, produced by change of habitat, Mr Grigor's own experience entirely supports our own view of its nature :—"There is no tribe of plants with which I am acquainted that is so susceptible of climatic influence as the conifer. In the celebrated native pine-forests in the Highlands of Morayshire, any variety among the trees can hardly be distinguished. But I have taken seeds from these, and after raising them, have planted them on the warm sands only a little above the level of the sea, where a variety of foliage and habit became perceptible; when these had yielded cones, and another generation of plants had been reared near the sea level, I have found many of them so far removed from the ordinary type, that some individual plants could scarcely be recognised as belonging to the species. This tree is found to accommodate itself to circumstances, producing long or short yearly growths in proportion to the ripening influence of the climate which it inhabits. A few generations of the tree existing in a high temperature would, no doubt, render its progeny as tender as our greenhouse plants." (They would die first.) "It is many years since I have experienced the worthlessness of the plants of Pinus sylvestris, or Scotch fir, grown from imported seeds, on account of their being too tender to withstand the severity of winter in the north of Scotland, even in a nursery with some shelter. Nevertheless, the quantity of native Scotch fir-seed sown in Britain of late years, while a scarcity of seed in this country prevailed, has likely been less than a tenth part of that imported from the Continent, and sown throughout the country. Hamburgh is the principal depot for continental seeds of this tree, and the chief forests are Hagenow and Hagueneau. These forests, of similar name, are far apart, and although the difference in their altitude must be very considerable, the seeds of both produce plants too tender for Scottish moorland. Even those English nurserymen, whose grounds are considerably elevated, find that the Pinus sylvestris from continental seed does not produce plants sufficiently hardy to endure the severity of an ordinary winter. Compared with plants produced from Scotch seed, even from a good climate, the difference is great. It is perceptible in the one-year-old seedling, but much more so after the second year's growth, when the plants from foreign seed become quite brown, with a faded or scorched appearance from the effects of the winter, and so damaged by the month of March that they are often unsaleable; while the plants produced from the seeds grown in the native Highlands of Scotland, under the same treatment, and standing alongside, have a fresh, green appearance; and such is the contrast, that, if placed on elevated ground, a plot of the one can be known from the other at the distance of a mile. In some warm situations in England, however, the plants from continental seed are found to succeed, and in ample shelter they grow rapidly; while as timber trees in Scotland, they are utterly worthless in exposed situations."

Mr Grigor's practical information on all points in which an intending planter is interested is particularly good. It is indeed chiefly given from the stand-point of the climate of the north of Scotland—that having been the sphere of his experience; but allowance can easily be made for this. The prices too, and the calculations of profit, must all be recalculated by every man for his own locality, and for his own day. In one sense it may be said, what is the use of giving calculations of price and value based on data (as some of his are) of the date of 1842? But they are of use as shewing the mode of calculation and the kind of expenses that must be provided for. Every one is not born a forester, and many a proprietor who, for the first time thinks [illegible] ing a bit of planting, will find these [illegible] useful guide in making his own. [illegible] the book is taken up with [illegible] ferent forest trees suitable for this [illegible] his he has naturally drawn [illegible] from Loudon [illegible] such other information as [illegible] accrued since the publication of that inexhaustible storehouse of arboricultural knowledge, and, as might be expected, this part of the book shares in Loudon's merits, and also falls into some of his errors.

We observe that Mr Grigor confirms, from personal observations one of Loudon's statements, which we have always looked upon with doubt. It is that regarding the growth of the silver fir after it has been cut down. Loudon, following Loiseleur des Longchamps and Dutrochet, states it as a fact, that the stump of the silver increases in the number of its annual layers after the tree has been cut down. As the fact is also vouched for by Mr Grigor, we may quote both what he and Loudon say upon it. Loudon says:—"One of the most remarkable circumstances connected with the silver fir, is the vitality of the stump for many years after the tree has been cut down." As far as we are aware, this was first noticed by Loiseleur des Longchamps, in the "Nouveau du Hamel," v., p. 316, where he says, speaking both of the silver fir and the spruce, that after being cut down the stump vegetates for some time; its external ligneous layers increase with the liber, and endeavour, by forming a callosity inwards, to cover the section of the stump. M. Dutrochet had observed this process taking place on the stumps of the silver fir in the Jura, in 1833; and he procured, in 1805, several stumps from the Jura forests, which were in a living state when taken up. One of these was the stump of a silver fir felled in 1791, which had thus been increasing in diameter during fourteen years, the new wood and bark being easily distinguishable from the former wood and bark, which were in a state of incipient decomposition. Another stump was that of a tree felled in 1743, and it was still full of life when examined at the end of the year 1836. The wood formed since the tree was felled consisted of 92 layers, the total thickness of which was nearly 2 inches. The wood of which the stump was composed when the tree was felled had entirely disappeared; and the thick rind or callosity which had formed round the margin had curled over, so as almost to cover the top of the stump. This stump which had lived and increased in diameter during 92 years, would in all probability have endured much longer, so that we are ignorant how far this singular prolongation of life and increase of growth may extend in stumps deprived of their trunk and leaves, and which only receive nourishment from the roots.—(*Gardener's Magazine*, vol. xiii. p. 93)."—Loudon, iv. 2333.

One would have thought the very magnitude of this Munchausen story would have put physiologists and arboriculturists on their guard, but it does not seem to have done so. They have continued to repeat the fable, and believe in it, and Mr Grigor among the rest. He says:—"None of the coniferæ spring from the roots when felled" (which, by the way, is too sweeping a statement); "but roots of the silver fir have been known, after the removal of the tree, to produce annual circles of ligneous matter, increasing the diameter of the stump, and forming yearly deposits, which have sometimes continued for many years. Around the outside, about 2 feet in diameter, I have counted eight very distinct circles of this woody substance of good average breadth, corresponding to the number of summers which had elapsed since the

felled. The substance has a creamy appear-
compressible as cork, and apparently imper-
moisture. Of the instances of this curious
n, the most remarkable is that recorded by
rochet," &c. And then he goes on gravely to
utrochet's absurdity above quoted.

Mr Grigor must not suppose that we doubt
d, or anything but his interpretation of what
That is permitted to us all without giving or
g offence. We fancy that we know perfectly
nomenon to which he refers. It is to be seen
niferous stumps. The hard wood decays first.
of the white wood remains, probably from the
sap in it being more generally distributed.
luence of the weather, and perhaps some chemi-
ge in the terebinthine makes its top assume the
a crust or callus, and the part so covered has
istaken for a more recent deposit of annual

If this is not what Mr Grigor has seen, and
ld happen to read this notice—some good-
friend is sure to point it out to him—we
sk him in the interests of science to send to us
n or part of a section as a specimen for exa-
n, and we promise him faithfully that if we
selves in the wrong we shall honestly say so.

But let him consider the absurdity of what we are asked to credit. Putting out of view, as possibly a careless turn of expression, the statement in Loudon that there were two barks, "the new wood *and bark* being easily distinguishable from the former wood *and bark*," we are to believe in a peculiar idiosyncrasy in the fir which occurs in no other tree. We are to believe that this posthumous growth has gone on in one tree for ninety-two years, and that it might go on for a still longer period. We cannot do it. We utterly disbelieve in the explanation. We disbelieve in its possibility. The days of miracles are passed, and we should as soon believe in a pump "drawing" without a piston as in a deposit of annual layers being made without leaves, which are pistons which draw up the sap in the tree, and allow it to deposit the woody fibre in its passage.

Putting aside such disputed points on which, consistently with general concurrence and approval, we may differ from Mr Grigor, we have to express a most favourable opinion of the work. We have placed it on our shelves as a first-class book of reference on all points relating to arboriculture, and we strongly recommend others to do the same.

The Garden.

THE SUBURBAN AND AMATEUR'S GARDEN.

CHAPTER III.

THE CULTURE OF VEGETABLES.

THE second sub-division of the second section comprises principally the members of the Brassica tribe, such as cauliflower, broccoli, Brussels sprouts, the various kinds of cabbages so called, savoys, borecole or kale, &c. To these may be added, under this section, celery, parsley, lettuce, and such other salading as radish, mustard, and cress, which do not require transplanting at any time, but are more conveniently introduced for commenting upon here.

The seed sowing, pricking out, transplanting, earthing up, and all the other minutiæ essential to the well-being of the growing plant, are so precisely similar to each in all of these individual sections, that it would be a work of supererogation to take them up *seriatim*. Although all those mentioned above do not come in at the same season, nevertheless there are three particular periods when they should be sown, almost on the same day. The first of these is in March, the second in April, and the third in August. [illegible], with proper care and a good [illegible] furnish [illegible] supply throughout [illegible] The August sowing is probably [illegible] requires [illegible] [illegible] ...ge further [illegible] too young to be [illegible] August. Cauliflower, as is well known, cannot endure many degrees of frost, and therefore requires protection in frames in by far the greater part of these islands, and that protection must be proportioned to the severity of the weather, else nothing short of failure will be the consequence. All the other brassicas are comparatively hardy, and will stand out in the open air into beds, if the locality is at all favourable. All plants should be pricked out of the seed beds in other beds prepared for them, which gives them a constitution to begin with, of a character immensely superior to those pulled out of the seed-beds, and planted afterwards into permanent quarters. In fact, the benefits that accrue from pricking out August-sown plants is self-evident after winter is past. The first week of August is the proper time for sowing cabbages, savoys, borecole, a few of the early autumn broccoli, and a few Brussels sprouts for first use, because a number of this sowing is apt to run to seed; but as cauliflower has a little frame protection, it should not be sown until the 20th of the month, and should be pricked out according to size, as the smallest plants are admirably suited for filling up the gap between the larger ones and those of the first spring sowing. In large places it is advisable to sow a few seeds in boxes in February, bringing them on into a greenhouse temperature, and pricking them out into slight hotbeds or [illegible] heated with hot water, in order that there may be no deficiency of supply. For early spring cabbages, again, there must be a few seeds of such sorts as Little Pixie, Enfield Market, and Champion, sown from the 15th to the 20th of July, which should be pricked out in the first place, and then planted, according to size, on exposed southern wall r, not more than 12 inches apart either

›f these vegetables should be transplanted
'ell prepared ground, from 20 to 24
; square; and we have again to insist
the following line of operations being
:d with all the Brassica race—Prick
dibble in the plants from the seedling
rst to a *nursery bed* about 4 inches
By this probationary method, roots
rmed in mass, and much quicker than
.ts are merely pulled out of the seedling
and planted into permanent quarters;
ver, there is much less chance of de-
on from various causes, and the plants
elves grow ultimately to greater perfec-
If you buy cauliflower plants, for in-
, at any of the marts in the spring, ten
: but fifty per cent. of them die, if
d out into permanent quarters. Instead
ıg that at once, prepare a little corner
ir reception, nurse them on for three
weeks, and then plant for cutting, and
shot will be success and not failure.
them growing on with a plentiful supply
ulants, if size be desirable. Liquid ma-
guano water, nitrate of soda, and phos-
generally are capital stimulants for
aging growth in all this tribe of plants.
naintain, however, that their cabbages
eir cauliflower are much more palat-
ithout stimulants, which must be very
ı matter of opinion, and each cultiva-
uld be guided accordingly.
ly salad vegetables are very much in
: *celery* may be considered to be the
mong them. Although not in general
tion, it is one of the articles that is
ncreasing in popular estimation, be-
t can be served in so many ways, form-
ecially, an excellent after-dinner ad-
It is in season, too, when many of the
salads are very scarce, and, on that
t, is doubly valuable. Anyone may
crisp, and of fine quality, by manuring
tering the plants liberally during the
; season. It requires a little assistance
cial heat to push forward the seeds
young plants, but a portion of the
which is generally called in to do duty for choice flower seeds is also suitable for this. For that class, however, who have "too many irons in the fire" with the limited hotbed and the great number of packets of choice seeds, we would recommend them to buy as many young plants as will serve their purpose, and plant them in beds made up after the following fashion:—Given a piece of good soil, mark out two parallel lines, from 1 to 3 feet wide; take a spade and throw about 9 inches of the soil between the lines, in the form of ridges or banks, on either side, which, when finished, will leave the trench about from 12 to 18 inches below the level of the top of these artificial banks. Put in a good quantity of manure and leaves into the trench, and dig over the whole with a spade; then plant about 9 inches apart, either way; water afterwards, to wash the soil among the roots, and the operation is complete. As the plants grow, they must be earthed up for the purpose of blanching, but it is better that they should be of some size before they are interfered with.

Parsley is almost invaluable for garnishing, and, on that account, is much sought after. It may be sown early in the season, and remain where sown; or it may be sown at two different times, first in April and then in August, and the seedlings pricked out in the usual way. It is very much finer in quality so treated, and it bears transplanting excellently. For winter use it requires the protection of frames to keep an accumulation of moisture from doing injury. Both frost and snow affect its progress and its preservation much; and the more precaution taken the better the reward ultimately.

Lettuces and *endive* are both excellent, the one for summer and the other for winter use. Any piece of garden soil will grow them. Generally, among amateurs, they are kept in the seedling beds, but every one who has regard for first-rate salading ought to transplant them, to see properly their worth. If planted between cauliflower plants, they will be fit for use before the leaves of the grosser vegetables overshadow them. Endive requires to be sown in July, planted out in August, tied up with bast in September for blanching, and made use of when the frost makes its appearance, the leaves then being more delicious and crisp. Other small saladings grow all the better if sown in good rich soil; and, as they proceed in growth, should be kept clear of weeds; hand weeding, and the hoe, being essential requisites.

Cucumbers are gaining also in importance. There are various ways in which they may be cultivated. Some prefer the gherkins, or small cucumbers, to the larger samples, because of their value for pickling purposes. Indeed, most people prefer the pickle to the salad. To grow them to the large size requires a good deal of attention, and some considerable expense; and it is only in large gardens where they are seen so cultivated, unless some amateur makes their growth a hobby, and then he is never far behind his richer neighbours, who have the assistance of professional gardeners. To grow them so, we would refer our readers to the remarks on the cultivation of melons, for what suits the one is not only not bad for the other, but is absolutely essential. Anyone, however, at a very little expense, may grow the gherkin by getting a few seeds, giving them a comfortable berth in April, and by May the plants get strong, and are fit for planting out in the beginning of June, under a hand-glass, or even a pot inverted, in cold nights, and during hot sunny days at first. By degrees harden them off to live on their own account, and if they have been treated to a square yard of manure, they will grow rampantly, yielding flowers and young gherkins in abundance during August and September.

[illegible] ever [illegible] largest [illegible] heads [illegible] summer

seedlings are apt in ill-cultivated soils to "button"—that is, form premature heads; they are only useful, on that account, for pickling purposes.

Broccoli has no better representative than Snow's Winter White for general use, and for late work get Williams' Alexandra. Nothing else is needed to keep up a good supply in favourable winters.

The best *cabbage* for general use is Nonpareil. It is an old estimable sort, forming fine compact and excellent conical bundles of leaves. Mr Barron strongly recommends the Rosette Colewort, as suitable for growers who prefer small to large cabbages. It is an earlier sort than the one above recommended, and on that account is valuable.

The *Savoy* variety is best represented in the Early Ulm, and for large growth the Drumhead. These are estimable, owing to their capacity for withstanding frost, and being highly palatable as a vegetable during winter.

The so-called *Imported Brussel Sprouts* are generally sought after, and a good strain of them is a good thing. Scrymger's Giant is said to be a desirable novelty, and to those who value variety, it may be wisdom to procure this one.

Borecole or *kale* is diversly estimated. The German Greens are the favourites in certain localities, while the Cottager's Kale ranks first in importance in other places. Both are excellent vegetables, and come in well after the influence of frost upon their leaves. In fact, with the exception of Brussels Sprouts, we know of no winter vegetable so generally useful as the borecole.

Celery is a most useful salad vegetable, and much in request. There are so many varieties offered for public favour, that the majority get confused in the selection, often having to leave the selection to other sources. The very best varieties are Hood's Imperial Dwarf Red, and Turner's Incomparable. Both these sorts stand the severity of the winter fully in advance of their compeers, and remain in a fit state for table for a very long time; they do not "bolt" so soon as some others. The bolting is the running to seed early in spring, which destroys all crispness, and renders the salad unfit for use.

Parsley is generally good, but that which is best to ask for is Myatt's Garnishing.

Lettuces are in great variety. The Cos or summer sorts have no better individuals than Moor Park and the Paris White. The cabbage sorts for autumn use and for keeping over winter are also a numerous lot, but by all means get the Neapolitan and the Stansted Winter, which latter is both an early and a large growing sort.

The French breakfast *radish* is becoming very popular, being an oval sort, of scarlet colour, tipped with white, and on all hands considered the earliest and quickest growing radish in the market. The olive-shaped scarlet is also a good sort, and much esteemed in the Paris market, where they grow and use these things to perfection.

The French *endive* is also one of the most desirable of that winter-growing plant, and comes in well when lettuces are scarce.

In case *cucumbers* should be cultivated by any of our readers, let them get the Telegraph for growing to a large size, which is also a prolific bearer; and Master's Prolific for general purposes.

CHAPTER VI.

FLOWER SEEDS.

The flower seed trade has now become of gigantic proportions. It has more than quadrupled itself within these thirty years. The varieties that have been introduced, and are continually increasing, are something almost alarming, and this, too, from the temperate and semi-tropical regions of the globe. "Still they come" is the cry, and it is almost necessary to satiate an almost inveterate thirst of novelty. The numbers of well-to-do people are fastly increasing, and with their increase of comfort, in the shape of means, comes a desire for beautifying their residences. That kind of beauty which nature, from her inexhaustible resources, provides, is as much a question of degree of excellence as the various samples of architecture that are reared all round about us. Ambition creates a desire, and wherever the leanings of the mind dictate, thitherwise is its influence directed. Flora has an extensive dominion, and by far the cheapest and least unsatisfactory method of adorning residences of all kinds is that of having recourse to those flowers generally known under the designation of *annuals*. It is an expensive concern getting up a collection of "bedding-out plants," such as verbenas, pelargoniums, calceolarias, lobelias, and such like; for unless we can procure good plants at planting-out time, and plenty of them, the crop of bloom falls far short of general anticipation, and especially of the anticipation of the enthusiastic amateur. Moreover, with all due deference to the decorative capacity of the bedding-out plants named above, there can be such an array of flowers produced from the parti-coloured hues of some of the choicer annuals, which often eclipse the bedders. Take, for example, the great amount of flowers producible from the many varieties of Stock, their elegant habits, and the duration of the inflorescence, and how very few of even the choicest bedders can beat them. The same remark is applicable to Asters, especially some of the rarer French and German introductions, which comprise some extraordinary fine things. The Helichrysums or Everlastings, the Phlox Drummondi, the varieties of Sweet Scabious, and the red Saponaria, are among the most beautiful among flowers, and, what is of great consequence to all, their beauty is not evanescent. Some annuals are exceedingly short-lived—a blaze of flower, and all is over for a season; but such kinds are only fit for individual patches in a mixed border. All these named above are capital things for the choicest parterre flower-gardening. Of course they all require systematic arrangement, but a little attention given to the height they grow, and their habit generally, will enable any amateur to dispense, in that particular, with professional assistance. There is much pleasure to be derived by any lady or gentleman taking a personal interest in this matter. All good arrangements should be in the mind's eye, and specially provided for, not only at the planting-out period, but before the order is given to the seedsman. All first-rate gardeners have the whole of their flower-garden arrangements mapped out during the floral campaign of one year for the following year's display. It is only by strict personal survey that the proper shading and blending of colours can be catered for, and properly carried out.

It must be premised by all our readers that tender annuals require a little artificial heat for proper and speedy germination. Without a hotbed, or some such thing, these fine annuals cannot be had in perfection in the greater part of our islands. There are some choice spots, to be sure, where such a thing as using artificial heat might be looked upon as a gratuitous practice; but, speaking generally, it is an absolute necessity. Amateurs must either provide fermenting material, in the shape of stable manure, or have flue or pipe heat, else no satisfactory issue can be looked for. In fact, they must either have that, or buy young seedling plants from one or other of the various nurseries. If gardening be followed for the love of it, the tending of the seedlings, from the period of germination to the period of infloresence, is emphatically the better and, it may be added, the cheaper method. Any seed catalogue gives precise instruction as to what is hardy and what is half-hardy among annuals. All the latter must be germinated under the pressure of artificial heat; all the former can be sown in April or May out of doors.

One thing is of germane importance—that is, that small seeds should never be deposited in a rough, ill-worked, clayey soil. You might as well deposit them in the bottom of a lake, or in a brick-kiln, to expect them to develop themselves and grow. Indeed, large seeds have a great disinclination to move in an ill-ass[illegible] a soil [illegible] favourable [illegible] insec[illegible] [illegible] equa[illegible] embryo [illegible] ntain the [illegible] which [illegible] rally demand [illegible] nothe[illegible] consequently, ensues, [illegible] death; and what is left often falls a prey to the predatory insects. The seedsman is often unjustly blamed. Another error in practice, the results of which are generally attributed to the vendor, is the covering of seeds too deeply. All seeds should be covered with soil in proportion to their size, from a couple of inches for such large seeds as sweet peas, to an eighth of an inch for such seeds as Calandrina discolor, the various Gilias, and such-like. Many thousand packets are sacrificed by the nondescript gardener and the unthinking amateur, by what cannot be characterized as anything else than immural treatment. Another reminder to all concerned is essential, and that is, with reference to burning the seeds, and destroying their vitality. Given one of these fermenting beds, and some hurriedly get them up, and quite as hurriedly deposit the seeds. What is the consequence? Fermentation, which does not take place in any violent way for a time, sends forth its scalding vapour some days afterwards, in the limited area of a dung-frame, and no vegetation is safe within. The bed should be properly tempered, and the scalding vapour passed away, before sowing be attempted.

It is better to sow thickly, either in hot-bed or border, because by the one plant nursing the other the whole are benefited at the first stage of development. But, if the plants were allowed to go on until fit for planting out, their constitution would be weakened, etiolation would ensue, and death to many would be the sequence. To counteract this, more particularly with reference to those in the dung frame, the seedlings, when about an inch long, should be pricked out, or replanted, say from 2 to 4 inches apart, according to the habit and stature of the kinds. This induces stiffness or density of habit, and greatly promotes profuseness and duration of bloom. It is generally towards the [illegible] of April before the seedlings will be ready for manipulating; therefore, select a nice warm corner of the garden, at the foot of a wall facing the sun; there a little bed can be made of the best light soil at command. Two inches of soil laid upon 2 inches of manure does excellently, and the

, besides feeding on the manure, lift good balls for proper transference to ment quarters. We have already suffi- y descanted upon the soil, and endea- d to shew the uninitiated what its pro- s ought to be. If iteration was necessary, articularly with reference to the flower- nd borders. A few shillings expended ep digging, and in the correction of it, ve stated, is money profitably invested. order that our readers may follow us some degree of order, we will classify marks on annuals in the next chapter, the two distinct headings of (1) half- or tender, and (2) tender annuals.

CHAPTER V.

HALF-HARDY ANNUALS.

cks.—There are three distinct kinds ocks—the Ten-week, the Interme- and the Brompton. The first is well d, owing to the period of its life from ger- ion extending over ten weeks. The nediate sprouts from seed, and grows, s, and lives over the ordinary summer l up to the incoming of frost. The pton is purely a stock for a mild climate, must be sown in June and July, grown autumn, and remain in a quiescent state winter, flowering on the return of . There are two distinct kinds of Ten- Stocks—the large-growing and flower- ariety, and the dwarfer-growing and ing variety. Both are of general im- ice, being adorned with a variety of s, and the dwarf kind is generally a or two in advance of its more gigantic er. These are the particular kinds ought to be sought after for early ing. The Intermediate Stock begins er when the Ten-week is waning, pro- the seed be sown at a similar date. arlet, the white, and the purple of this aordinary fine. Either the true Covent n seed or the East Lothian ought to be ed, as we have found either of these to be less inconstant than what might koned from nondescript seed. The ting of the seed is a great matter, e source of supply is not less so. The Brompton class comprise what is called the Perpetual Flowering, the Giant Cape, and other designations. The pure Brompton is fully as desirable as most of the so-called hybrids, as many of the latter, from crossing with autumn kinds, have a tendency to flower too early in winter, and get killed. The pure Brompton seldom flowers till May, and in that month and June, in mild localities when well managed, it is simply magnificent. In many gardens it grows so rampant, during autumn, that at times it is advisable to lift the plants tolerably careful in September, and replant them so as to check exuberance, and prepare them all the better to withstand the rigour of the winter. Readers will therefore note that, with proper management and in mild localities, a supply of flowers can be had from stocks alone from May to October.

Asters have become uncommonly numerous, and are in great demand from their easy culture and the great variety of form and feature they undoubtedly possess. Their numbers are on the increase every year, and with the exception of stocks, they are decidedly the foremost among the plants fit for an amateur's garden, and even in our greatest gardens they assume a first-rate importance. The Truffaut Asters are among the giants of the race, growing tall, and yielding a multi-varied lot of captivating flowers. Nothing is probably more bewitching than the parti-colourcd Hedgehog Asters, having usually large white centres, with very gay surrounding colours. For effect in beds, there is nothing grown equally to the Pæony-flowered Asters. Every plant is a bouquet in itself, and is capable of yielding, under first-rate cultivation, several dozens of flowers. Then, there is the Tassel-flowered (Giant Emperor) Aster of the Royal Horticultural Society, which possesses a splendid habit, and is largely grown in England; as well as many other sorts, those specified being best for general culture. A packet of every one of the kinds enumerated may be safely selected for every garden, be it large or small. The Quilled Aster is still the favourite for a stand of exhibition flowers. It is by no means so showy, either in bed or border, as those above specified; but it will never be surpassed as a neat exhibition flower. As a rule, each plant should have ample growing space, and its central stem be neatly supported by a stake. If this be left undone, the plants look unsightly, and the flowers get out of position. The better the Asters are cultivated, the longer is the duration of their inflorescence.

Marigolds—French and African Marigolds do splendidly if grown between the rows of dahlias. They require a soil well enriched with manure, and they thrive all the more luxuriantly if copiously irrigated during the growing season. Indeed, without a rich soil the flowers can scarcely attain anything like a full development. For that special reason the plants are better grown in a bed or large patch, and if thus treated they will amply repay labour by the full fine flowers which they will produce. All bad strains, whether of the orange or lemon on the one hand, or the French on the other, should be pulled up so soon as they shew their quality.

The *Everlastings* (Helichrysum) are gaining in popularity every year. The great diversity of colour that pervades a batch of them is an additional badge in their favour. Many of them grow tall, some quite 30 inches high, and all of them to such height as to be best suited for planting as back row plants. The seed must be sown early, so as to provide for early blooming. The seedlings should be treated exactly as recommended for stocks, the pricking out being of equal importance for insuring strength and duration of the flowering period. It is only on the appearance of frost that t[illegible] flowers get [illegible] double [illegible]

[illegible] *Drummondii* is one of a class that is particularly interesting. It is beautiful when well grown, for bedding or massing, and for rows. Nothing looks better than a few of its varieties in bouquets; indeed, it is one of the first annuals that a lady would cut for even a choice bouquet. The depth, intensity, and variety of colouring which can be had from a packet of mixed seeds is surprising. It requires careful nursing in the frame until all danger from frost is past. Slugs and snails are its most determined foes, passing over many things to feed upon its stem and leaves.

Scabious.—Of all the tall-growing annuals in cultivation this is one that malcontents shew most dissatisfaction about. Some think it is too tall, and not good enough; others complain of some flowers being too rough and too gaudy; but almost all admit the beauty of this composite plant. It produces flowers much larger than a crown piece, with such a variety of colour as to demand more than a summary glance. The foliage and stems are lean and not so well favoured, but the flowers are exquisite, and consequently are largely sought after for competition stands, and for table bouquets.

Zinnias are more tender than any of those yet named; they don't grow well in a cold climate. The Continent is more a home for this flower. Where, however, cultural care is manifested, in the shape of protecting the plants till the middle of June, and then planting them out when strong in beds or borders, they attain a perfection which well repays those who can afford time and space so to treat them. There are both single and double varieties, some of the latter looking quite as well as some of our ranunculus flowers; the former are also beautiful from the dark-coloured face which the best of the [illegible] puts on. A good light soil and a warm [illegible] should be selected for this family.

[illegible] Calabrica.—This is an in[illegible] annual, alike the favourite of the gardener and amateur. A circular bed [illegible] the form where it assumes a perfection [illegible] loveliness. To have it so, the plants should be nearly of uniform size; without that there will be a want of regularity of form. It can be grown and flowered as a

annual, but to have it at its best, it
ome under the treatment of half-hardy
s. Seed should be sown beginning of
and seedlings afterwards treated in
way as we have recommended for all
annuals. The white variety is worth-
ı comparision to the red one, because
stunted habit and indisposition for
ıg. Let every one bear in mind that
d Saponaria, while it looks well enough
es or in patches, makes a far better
ır bed than it does anything else.

: above comprise the principal portion
uals requiring artificial heat for germina-
hat everybody should select. There
ıowever, some biennials requiring the
treatment, to which we beg to call
l attention.

'irrinhums are the flowers of the million,
lthough, strictly speaking, a biennial,
wers can be had the first season the
s sown. All that is necessary is to sow
to prick out in a warm bed of soil as soon
: seedlings are unduly interfering one
ınother, and afterwards to plant a foot
in a well prepared bed or border. If
ractice be correctly followed, the seed-
will show flower in July, and flower on
e end of the season. There are so
fine varieties, comprising selfs and
s and mottles, that they at all times
and admiration. The plants may,
:y may not, stand over the winter; but
' do, the inflorescence in May and June
ıething very imposing. As a rule it is
to sow in July for plants intended to
over the rigours of winter, and if seed-
be planted out of doors, in the latter
f August, they have much better chance
ıding over.

riculas.—The Alpine auricula is a com-
vely neglected plant. It is only to be
in the gardens of a few enthusiasts for
out-of-the-way things. It is, neverthe-
one of the most captivating of early
ing plants. What with the foliage, the
ect flower stems, and the great umbels
wers of extraordinary substance, it pre-
ın unusual amount of desirable points
ıe onlooker's admiration. With the various shades of colours, and the admirable contrast which characterizes the worst of their flowers, the interest is almost indefinitely maintained. To grow them well, first get a packet of good seed saved from the choicest strains, sow it in March, in any position, where artificial heat can be procured. It is of the utmost importance that the seedlings be kept near the light, and take care that a practice is carried out which will not draw up the sessile-like crowns into an elongated state. Nothing but defeat can be counted on if haphazard treatment be the guiding rule of the place. Far better delay the sowing till June or July, and sow in a warm sheltered place out of door. Only stipulate that the seedlings, in their embryo state, be watched from the predatory exploits of slugs. By sowing in a frame early, much stronger plants are obtained, and they are far better able to stand over the winter, and flower afterwards with increasing strength. The young plants will not flower until the second season after sowing. A little extra care is well spent in tending the Alpine auriculas, or the "dusty miller" of olden phraseology. This tribe is quite hardy, and once any one is in possession of a batch of them from seed, he or she can select the best favoured sorts, and keep them for years by cultivation and division. This process of division had better be explained. It is the lifting of the old plants and dividing them up into so many pieces as practicable, replanting them again with a little fresh compost, which infuses an additional vigour to the system, and has a tendency to renew the energies of growth.

Hollyhocks.—The seeds of these may be sown in a hotbed to accelerate the flowering of the plants; but, as a rule, seed sown out of doors in June and July, produces plants of sufficient strength to withstand the winter, and grow on vigorously the following spring, for summer and autumn flowering. Real admirers of the hollyhock prefer to obtain plants of choice-named sorts, and they can be had for money; but, if it be an object to obtain a display at a minimum cost, seed is the desirable way to go about it. Nothing takes less looking after, and any ground that would grow cabbages to perfection, will also grow this showy flowering plant. Manure is the best gardener for lots of these succulent-rooted plants. All the attention, in the way of management, required, is sufficient staking for support of the flower-stems. No plant should be allowed to carry more than one flower-stem, and if the flowers come ill-arranged and too thick upon the spike, they should be thinned out to something approaching regularity. In mild winters the seedlings will stand over without protection. Choice-named sorts, however, must be lifted, potted, and wintered in a frame or cool greenhouse.

Carnations and Picotees—These are first-rate border plants. From seed they are particularly adapted for this, and they are so choice and neat-looking for bouquets. Curious enough they do not seem to be cultivated in this way half so much as they might be, and we beg to call special attention to them. The best way is to sow under a hand-glass in a well-prepared piece of soil, where sand predominates. The best time is April and May for the following year's flowering. In about ten weeks from the time of sowing, the seedlings will be advanced enough for pricking out, and if the compost selected be a little stronger—that is, have a greater proportion of loam and leaf soil and less of sand—they will quickly assume a vigorous appearance, which is a great matter with small growers. They require no protection, only it is judicious to make as good a selection of a site as possible, for [illegible] uninterrupted season of [illegible] cultivated for years [illegible] any extra good [illegible] the batch [illegible] operation successfully by using [illegible] knife. As a rule keep about 6 inches below the crown shoots operated upon, and make the wound inwards in a slanting direction, then place a hooked peg at the base of the layer, so as to keep the scion in a perpendicular position and a fixture; cover up, after layering of the whole has been finished, with some of the prepared soil in the shape of little mole-hills, and keep the centre of the plant a little hollow, for the purpose of receiving water supply. This nice operation would prove pastime for thousands in a spare hour of a summer's evening, and July and August are the months to begin and complete the job.

Sweet William.—Few, if even the artizans, in our realm, have not seen or heard of the Sweet William. It adorns every cottage, and is to be found in most of the great gardens of the country. It is another of these highly decorative biennials that we have selected for a prominent position, but is so easily cultivated and so well known, that our remarks do not require to be lengthened. There are several kinds under cultivation, the auricula-eyed strain being, out of sight, the best for sustained admiration. The colours are so distinct, and the form in every way so pleasing, as to command an undivided attention. Those gaudy sorts that have colours running in all directions over the surface, are only of a class to please novices. The educated eye abhors confusion, and these varieties in question cannot be characterised in any other way. The double breed is, by some, thought to be desirable to propagate and tend; but, in this flower, in our thinking, they must be dubbed monsters. All double flowers are so looked upon by the severe botanist; and, but for the florist taking them patronizingly into his domain, all such flowers would soon be lost sight of. Distinctness of feature is the main point, and we counsel all growers to look to this and they will soon become converts to our way of thinking. Seed should be sown in May out-of-doors, and plants will be ready for planting-out in September, into permanent quarters. All inferior sorts should be eliminated, and seed only saved from the crimson strain, as it always produces the best sorts, and all the colours come from it.

Wallflower.—The German wallflower is

now introduced in a good many varieties. The worst of them are worth growing, from their freeness in flowering and from the agreeable perfume that the flowers disperse. None of the more recent introductions can approach the old deep crimson of the days of yore. It was to be seen at many a cottage door, and the inmates took great delight in preserving it as long as possible. Seed was always saved, and the breed propagated and protected; but it seems, in these latter days, to be all but forgotten. We must endeavour to resuscitate the taste for this charming variety. The German sorts generally produce larger flowers; as a rule, many of them coming double. The best time to sow the seed is in April, out of doors, and plants will flower profusely in late winter and spring, from such seedlings. Any soil, and any situation, will suit them. It is because of their easy culture that their merits, in some measure, are neglected, if not ignored.—*A.*

ON THE CULTIVATION OF VIOLETS IN PARIS.

A FEW words on the cultivation of violets in Paris may not be uninteresting to some of our readers. In the milder climate of the residence of the French Emperor, the growing of violets in the open air is naturally much more extensively carried on than in England or Germany, where at the unfavourable seasons, when they are not valued, they are principally confined to covered boxes. There are gardeners in Paris who plant 4 acres with violets, and make a very good business out of them.

The Parisian cultivates only two kinds of violets largely, the Everblooming and that called the Parma violet. The soil of Paris is well known to be heavy—here very chalky, there very clayey—and consequently not easy to work; as, however, the cultivation of violets requires especially, if not a light, at any rate a loose and nutritious soil, the first business of the Parisian gardener is to produce this. The violet requires in Paris a sheltered position from the north and west, on which account a slope lying towards the mid-day sun is preferred for the location. So treated, it flowers at the end of October, and if the season proves not too severe, it continues to flower most freely and abundantly throughout the winter, when the flower fetches the highest price. The violets are planted in rows, at a distance of 30 centimetres from each other, four rows being usually on each bed, so that, from a pathway 50 centimetres wide between them, one can easily pluck the flowers from two rows at once, right and left. It is, of course, understood that in planting them the strongest and healthiest shoots of the plant are taken, or even strong plants are divided. They proceed, in fact, in the same way with them as with strawberries. They prefer to plant in spring, after the real harvest is over—that is, in March or the beginning of April—rather than towards the end of summer or beginning of autumn. Another reason is, that the winters are sometimes very severe in Paris; and then the young not well-rooted plants might suffer. For manure, again, the treatment is the same as with strawberries, to whose culture, altogether, that of violets bears the most resemblance. They use the sweepings of the streets, not burying it however, but laying it round about the root of the plant. Upon 1000 square metres of land they lay, as a rule, 4 cubic metres of manure. A plant may exist only two years, because in three years a good plant with abundant blossoms is exhausted. During this time shoots, &c., must be removed, so that the whole strength of the plant may be directed to the bearing of flowers.

The produce by the cultivation of violets, as is the case in all culture, varies according to the state of the weather. There are good and bad years, the temperate years being the most productive. A bouquet of violets will bring, in the best season, 50 centimes; in the worst season (for the gardener), 10 centimes. Four acres give between 3000 and 12,000 bouquets. If we reckon in a good harvest the average price of a bouquet at 30 centimes (certainly rather high), 12,000 bouquets will bring a gross return of 3600 francs. If we deduct 300 francs for the rent of the acres, and 1890 francs for labour, manure, plucking, and other expenses, there still remains a clear profit of 1410 francs. In an average harvest, 4 acres give about 6000 bouquets. In this case, a bouquet will, at the best time, fetch 1 franc, at the worst, 20 centimes. As, however, in comparison with a good season only half the number of bouquets will be plucked and used, so are the expenses also lessened (including rental only 1590 francs), according to which there will remain a clear profit of 2110 francs. In bad years, again, 4 acres produce only 3000, bouquets the highest price of which will be 1¼ franc, the lowest 40 centimes; and as the costs are in this case only 1290 francs, the receipts are also only 2475 francs, there remains a profit of 1185 francs.

As cold winters in Paris are rather frequent, and for some time on that account there can be no violets cultivated in the open air, the gardener has then recourse to boxes in which he forces them. During this period violet bouquets are of course much dearer. The lowest price of one of them is 1½ franc, the highest, on the other hand, 5 francs. It is therefore not to be wondered at, that under such circumstances, in spite of the increase of costs, a box planted with violets gives from 2½ to 4½ francs clear profit. It would have been interesting to learn what quantity of violets are used in Paris, especially in winter. That will, however, never be known. For even if one knew how much free land is occupied for the culture of violets, as well as how many forcing boxes are used for the same purpose, only an approximate estimate would be possible.—*Woehenschrift, Jan.* 13, 1869.

GRAPES AT BEAUMANOR PARK.

THE exceptional and trying character of the season just passing away, which has proved so fatal to so many subjects in the vegetable kingdom, has left behind it many useful lessons, which cannot fail to force themselves on the notice of all whose duty or inclination leads them to take lessons in the pages of nature.

To secure the full benefit of all information thus gained, and in order that all may share in it, it is desirable that no one may withhold any observation bearing on any subject of importance.

In the leading columns of the *Gardener's Chronicle* notice has recently been taken, in answer to a correspondent, of the failure of a crop of grapes, the cause of which was ascribed to a deficient supply of irrigation, and the defaulting gardener was severely, and perhaps justly, censured for this neglect of duty.

At Beaumanor Park, the seat of W. Perry Herrick, Esq., in North Leicestershire, we have a case which seems to stand out in striking contrast to that referred to above, and which shews very forcibly the difference of results in different kinds of soils. The vines at Beaumanor have been planted twenty-two years, the borders being formed by Mr M'Lean, whose fostering care the vines still enjoy, after the most approved fashion in vogue in those days, and during that long period have been regularly attended to with the usual applications of liquid manure, &c., deemed so essential to the successful culture of the vine, and have always made a fair return in the form of good crops, for the labour thus bestowed on them. This year, however, the borders have not had a drop of artificial watering [illegible] them for the [illegible] patent reason that none [illegible] that Leicestershire [illegible] ght quite as much [illegible] indeed, considerably [illegible] they have received [illegible] notwithstanding [illegible] the crop that [illegible] more particularly [illegible] every respect the produce [illegible] nches being of good size and shape, with [illegible] beautifully-coloured, and well flavoured berries.

This happy result, under seemingly unfavourable circumstances, may undoubtedly be ascribed to the texture of the soil composing the border. This may be best described as a kind of oily marl, which, even in a comparatively fresh state, has a very adhesive tendency, and though, in the formation of the border, the usual accompaniments of bones, lime, rubbish, &c., were added with a liberality calculated to counteract the evils attendant on the use of soil of an over-retentive nature, this season has effectually proved that the decay of the fibre, after lying for twenty-two years without addition or renewal, has increased its retention to such a degree as to render artificial irrigation, in ordinary seasons, superfluous; and indeed they would seem, so far from being beneficial, to have a positively deleterious effect.

According to the practice which universally obtains amongst good grape growers, the borders were covered in autumn with litter, while in a dry state and securely boarded over, and on this covering being removed in spring, the surface was roughly stirred, and so hard did it become, that smoothing it over was rendered almost an impossibility, so that it has lain exposed to the sun, almost like a piece of ground turned up in autumn to receive the benefit of the winter's frosts. It ought, perhaps, to be added, that the vine rods are all in excellent condition for work, having made in this and previous seasons good strong wood, which has always been thoroughly ripened, and kept perfectly free from red spider and all other vine pests. In every respect, except the watering, the treatment has been exactly the same this season as in former years; but so marked have been the results, that we may safely predict that in future management of his vines, Mr M'Lean will take his cue from the lesson taught him by the memorable season of 1868.

In conclusion, one word to Mr Cannell. The vines at Beaumanor are, and always have been, pruned like fishing-rods, and so far from having met with their quietus at nine years of age, at twenty-two they have produced their finest crops, and their appearance is such as to justify us in expecting quite as favourable results for many years to come.

Rambles by Road, River, and Rail,

LETTER FROM DR R. O. CUNNINGHAM TO PROFESSOR BALFOUR.

" H.M.S. 'Nassau,' "
" Valparaiso, 3d November 1868.

ATHER more than a year ago I wrote to you, describing our experience during the first season we in the Strait of Magalhaens, and possibly you may erested by a few notes of our proceedings during st year. I shall confine myself principally, in the ing remarks, to what I have observed in the way any. We entered the Strait on the 17th of No- er 1867, and reached Sandy Point two days later, lovely spring morning, recalling the month of at home. The fresh green foliage of Fagus an- ca was really refreshing to the eye after our sea , and a considerable number of flowering plants in bloom. The Berberis empetrifolia covered round in many places with its prostrate stems, ly covered with blossoms which diffused a faint me, and the Primula Magellanica was abundant, specimens possessing white and others beautiful e flowers. Ribes Magellanicum was also in full r, and so were two or three Cruciferæ, and a y little Saxifrage (S. exarata), bearing a close al resemblance to our S. tridactylites. We re- ed at the settlement for about a week, during h I had many walks about the neighbourhood, ning a considerable number of specimens, botani- nd zoological, and then moved eastward, spend- few days at Cape Negro, where I procured is enneaphylla, Arabis Macleniana, Embothrium neum, Geum Magellanicum, and a variety of plants. Shortly after that, a long and tedious d ensued, the officers being occupied in deep lings, and as the ship lay a long distance from and there were gales without number, I was much confined on board. Towards the end of mber, we visited the Gallegos River, about 30 to the north of Cape Virgins, in search of a de- of fossil bones of mammalia, but were unsuccess- our quest, and about the middle of January we across to the Falkland Islands to provision and

We remained in Stanley Harbour about ten , and I was more favourably impressed with the unding country than I was on my first visit. xine marginata, Chabræa suaveolens, Dro- uniflora, Pratia repens, Empetrum rubrum, iana sp., Serraria Magellanica, S. alpina, and dium mohrioides, and various other plants were procured. On our way back to the Strait we passed through Falkland Sound, visiting the Tyssan group of islands, where I saw the Tussac (Dactylis cæspitosa) in great luxuriance, and found the ripe fruit of Rubus geoides. We also spent a day at Fox Bay (West Falkland Islands), and there I obtained two orchids which I had not previously met with. We had very blowy weather for some time after our return to the Cape, which greatly retarded operations. I spent a week during that time tented-out in Patagonia, but got very little in the way of specimens for my trouble, the most interesting 'find' being Crantzia lineata, which does not appear to have been previously recorded from the Strait, though it is recorded in the 'Flora Antarctica' as occurring in the Falkland Islands. I forget whether I mentioned in my former letter, that Apium graveolens is extremely abundant on both sides of the eastern portion of the Strait, wherever the land is at all damp, and, as Dr Hooker has observed, is perfectly wholesome. The survey of the eastern portion of the Strait was at length brought to a close, and after a few days' sojourn at Sandy Point in the first week of March, we set out to get a fresh supply of provisions at Chiloe, passing through the western part of the Strait and the channels leading northwards from it to the Gulf of Penas. We halted at various places on our way, and I made use of all the opportunities that came of going ashore and hunting for specimens. At Playa Parda Cove, in the western part of the Strait, I obtained, among other plants, Philesia buxifolia, Desfontainia spinosa, Escallonia macrantha, and a myrtaceous plant, which seems to be Metrosideros stipularis, and which does not seem to have been previously met with to the north of the Chonos Archipelago. It is, however, abundant in the channels, and constitutes a well-marked feature in the vegetation, frequently forming a distinct belt where the precipitous land dips into the water. At Poll Bay, where we spent two or three days, I found Gaultheria antarctica, generally growing along with Myrtus Nummularia, and easily mistaken for it at first sight, and Tetroncium magellanicum. Here, as in most places in the channels where there was any open ground, a solid turf was formed of plants of Gaimardia, Astelia, and Caltha dioneæfolia; and a species of Prestonia was plentiful in the hallow pools of fresh water. At Eden Harbour

Messier Channel, I met with Podocarpus nubigenus, forming handsome trees, and a curious little dwarf conifer, which also occurs on the mountains of Valdivia (and which Philippi has described under the name of Lepidothamnium), as well as Mitraria coccinea, not before obtained to the south of the Chonos Archipelago. We arrived at the fort of San Carlos, Chiloe, at the close of March, and remained there about a fortnight, and I was greatly interested in the striking character of the vegetation. Here I saw for the first time thickets of an arboreous grass of the genus Chusquea; myrtaceæ, bromeliaceæ, escallonias, and fuchsias constituted a very prominent feature. The trunks of many of the trees were covered with Sarmienta repens, and their branches with a scarlet Loranthus; and Gunnera seabra covered many of the sandstone cliffs with its large rhubarb-like leaves. Other conspicuous plants were a yellow-flowered Loasa, and Berberis Darwinii, and last, but not least, our common digitalis, which has completely naturalized itself. We left the bay of San Carlos on the 12th of April, to return to the Channels, passing between Chiloe and the mainland, and calling at two forts in the island on our way. At the first of these (Cava Oscura) I found Tricuspidaria in flower, and was considerably puzzled as to its affinities (Dr Hooker has since set me right with regard to it). The drooping crimson flowers give the tree a most remarkable appearance. Our next halting place was Port Otway (Cape Tres Montes). I spent an afternoon on shore there, and found Veronica decussata growing 6 to 8 feet high, and a beautiful Gesneraceous creeper, which I took for a species of Drymonia, but which I am inclined to suppose to be a Columnea. We entered the Messier Channel on the 17th of April, and remained there for about a month, surveying the harbours, during which we had almost perpetual rain. I was interested by procuring in several localities specimens of a handsome bignoniaceous creeper with rose-coloured flowers, and was in hopes that it might prove new, but have since found that it has been previously procured from Valdivia, being Philippi's Tecoma valdiviana. It does not appear to have been met before to the south of Valdivia, so this discovery of it in the Channels extends its distribution several hund[illegible] I have not said anything yet about the cryptog[illegible] the Channels. There are some [illegible]ophylleæ) [illegible] he[illegible] occur also in Chiloe and the south parts of Chili, and I did not meet with such a great number of species as I was led to expect. One, a species of hypopterygium, greatly delighted me by the beauty of its growth, resembling that of a miniature palm tree. We left the Channels in the middle of May, as the weather was so inveterately bad that surveying operations were rendered impossible, and, after a short stay at Chiloe, set out for Valparaiso, calling at Lota and Concepcion on the way. At Lota I saw for the first time that splendid creeper, the Copigne (Lapageria rosea). It was in great glory, flourishing even in the vicinity of the copper smelting works, where almost all other plants were killed by the sulphureous smoke. We reached Valparaiso on the 12th of June, and remained till the end of July, having an extensive experience of northerly gales, accompanied by rain. As it was winter when we arrived, but few plants were in flower. A little yellow oxalis, known to the Chilians by the title of 'Flor de Perding,' formed bright coloured patches on the hills, and a fuchsia with small pink flowers was blooming abundantly. I made a short excursion to the small town of Santa Rosa de les Andes, at the foot of the Cordillera. There the lower hills bristle with tall cacti, usurping the place of all other vegetation, and in many cases covered with a parasitic leafless Loranthus, with bright scarlet flowers. We spent the month of August very agreeably at Coquimbo, and there I made the acquaintance of the Nolanaceæ for the first time—Alona cœlestis covering the lower slopes of the hills, and two species of sorema being abundant on the lower ground. There, also, I saw for the first time the Aristolochia Chileinsis, the beautiful little Schizopetalon, Carica pyriformis, Llagunoa glandulosa, Schizanthus fimbriatus, two species of caladenia, a trichopetalum, &c. We returned to Valparaiso in the beginning of September, and here we have been since. There is now a wonderful variety of plants in flower on the hills, and intersecting quenadas. Tropæolum tricolorum, two yellow calceolarias, a yellow and a deep purple oxalis, a scarlet Alonsoa, several species of œnothera, Pasithea cœrulea, Puya coarctata, a verbena, species of Adesmia salpiglossis, Argemone, Tupa, Schizanthus, Anemone Polygala, &c., being specially plentiful. To-day we start for the south, there to remain for the next six or eight months. Excuse the hurry with which this letter has been written, and believe me, my dear sir, most [illegible]

"ROBERT O. CUNNINGHAM."

Plantations and Hedges.

FORESTS AND CLIMATE.

AT the meeting of the Royal Geographical Society, on January 25—Sir R. I. lurchison, president, in the chair—an inte-sting communication was read on the Effects on Climate of Forest Destruction in oorg, Southern India," by Dr George Bidie. oorg was described as lying near the centre f the Western Ghauts, chiefly on the eastern ide of the range, and at an average elevation f about 3000 feet above the sea level, but ivided into a number of hills and valleys, radually subsiding into the table-land of lysore. Formerly it appears to have been overed with forest, but the lower slopes are ow nearly denuded, and the rainfall is said decrease with the thinness of the arboreal egetation. As regards the elevated crests f the Ghauts, which intercept the rain-bearig winds of the south-west monsoon, they vould cause an abundant precipitation, vhether they were covered with trees or ot, but the water supply and fertility of he lower slopes and plains to the east are eriously diminished by the clearing of forest n the hills, and the result is brought about n the following way: the natural forest acts s a check on the too rapid evaporation and arrying off by streams of the rainfall on the urface of the land. As the rain descends, it s gradually conveyed by the leaves of trees o the dense underground of shrubs and arpet of dead leaves, and below this it enounters a layer of vegetable mould, which bsorbs the water like a sponge. By these neans, and aided by the roots of trees, the noisture is transferred to the depths of the arth and the reservoirs of springs; and thus s kept up a perennial supply of water to the lower lands; whereas, rain falling on the bare surface of cleared lands runs off at once by the nearest watercourses, and none is retained to keep up the flow during the dry season. Besides which, evaporation is much more abundant from a surface exposed to the sun than from land screened by a clothing of forest; and the flow of surface water tends to sweep away the clothing of soil, and render a district utterly barren. The area of forest cleared during the last few years for coffee cultivation in Coorg amounts to 20,000 acres. Dr Bidie's conclusion from this official tour in Coorg and Mysore was, that tropical forest was the *alma mater* of springs and streams. Many facts were adduced in confirmation of this view, and on the influence of forests on temperature, on the composition of the air, and on animal life. Species of plants characteristic of barren soils were spreading rapidly over the cleared districts. He recommended that a belt of jungle should be preserved, at least 50 yards wide, on each bank of the upper course of the Cauvery and its tributary streams, and that the forest on the crests and slopes of hills in which important streams arise should be also carefully preserved.

The President, in expressing the thanks of the Society to Dr Bidie, said it was highly gratifying to geographers to see the various branches of natural history combined, as they were, in this paper, in illustration of a great subject in physical geography. The subject also suggested matter for reflection on the part of the English nation, owing to the vast quantity of water which is lost annually, by not having proper means of accommodation, so that in time of drought our farmers have difficulty in obtaining supplies of water. A vast proportion of water ran off to the sea by the rivers, and a great part was drained off by the improved agricultural drainage. This subject had been discussed on a previous occasion, when Mr Markham read a paper on Southern India. In Russia, he could testify himself that the practice of cutting down great forests was, to a great extent, ruining a large portion of the country; the water was not husbanded in the manner which had been described by the author of the paper. The water ran off rapidly by the Volga and other great rivers, to the great detriment of the agriculture of the country. He hoped Dr Cleghorn, the conservator of forests in India, who was present, and to whom they were more indebted than to any other gentleman in reference to this important question, would make some observations upon the paper.

Dr Cleghorn said that, during the last twenty years, he had four or five times traversed the region alluded to in the paper. Any one acquainted with Dr Bidie, the Secretary of the Agri-Horticultural Society of Madras, would feel sure that he would give a useful and well-digested report upon the subject. The facts in the report dwelt mainly upon two considerations, which, he thought, should be discussed separately—the question of rainfall and the question of drainage. With regard to the progress of deforesting, it appeared that at the present moment about sixty Europeans went out annually as coffee planters to the Western Ghauts. The average acreage was, perhaps, 150 acres of forest, and the average amount of capital introduced by each planter was about £1500. Therefore, there was a large amount of capital invested in that chain of Ghauts. According to Dr Bidie's report, and according to the admission [illegible] planters themselves [illegible] [illegible]es had [illegible] He did not himself [illegible] [illegible] 000 [illegible] precipitation [illegible] than [illegible] [illegible] difference [illegible] quences were stated [illegible] have [illegible] first brought [illegible] ment in 1866 by two distinguished engineers, Colonel Lawford and Major Sankey. Major Sankey sent in a report with some remarkable artistical illustrations, shewing that the water was finding a lower level; that some of the antient Ghauts had suffered very much from the drainage; that the old channels were found insufficient; that the embankments were undermined, and had given way on the outer side towards the sea in various places, and that considerable damage had followed. Colonel Lawford, on the other hand, said that Coorg was becoming a great garden at the expense of the rice provinces below, which were likely to suffer very much. The Madras Government, early in 1867, directed Dr Cleghorn to proceed up the Cauvery, and to examine the effects upon the river bed. About midway where the Bhowany joins the Cauvery, he examined rocks on both sides where it was narrow, and he did not find any marked alteration. He insisted very strongly on the importance of keeping up the meteorological register at Mereara on the one hand, and on the other of keeping up the water-measurement at Tanjore. At the beginning of the south-west monsoon, more water flowed off than formerly, and the flow failed a little sooner. There was a tendency in that direction, but it was not then so marked as to warrant any interference with the clearings to any great extent. Certain remedies were proposed:—1. Conservation of forest at the head waters of the Cauvery; 2. Broad belts along the highways, particularly on the upper side; 3. The lofty wooded crests and eastern slopes facing the plains it was especially desirable to preserve intact.

The native population were almost unanimously of opinion that the climate was drier on account of these changes which man was gradually introducing. There were some interesting facts stated in Dr Bidie's [illegible] the increase of insects [illegible] insectivorous birds, the spreading of certain plants, and other remarkable facts which were well worthy of attention. What was required was, that the forest officers and the canal officers should cordially co-operate, and watch the changes from month to month. The forest department was a new department, initiated only twelve to thirteen years ago; it was gradually increasing in usefulness, and it was receiving that great attention which it deserved. There could not well be a more momentous subject for the consideration of that department than the one under discussion.

Mr George Campbell was opposed to any interference with cultivation, and advocated the construction of tanks as a means of storing up the rainfall of the monsoon in preference to stringent retention of the forests. He bore testimony to the improved management of the forests in the Central Provinces, and to the skill and energy of the departmental officers. Mr C. R. Markham had witnessed a reckless destruction of forests in more than one district of Southern India, and believed that some Government control was desirable. The President believed that the storing up of the superabundant product of rainfall as a provision for seasons of drought was necessary even in England.

The Stable.

ROUGH LEAVES FROM THE NOTE-BOOK OF A VETERINARY SURGEON.

CHAP. III.

THE *Reticulum, or second stomach,* may be almost passed over so far as any direct symptoms which it yields, leading us to recognize it as particularly the seat of disease. Nevertheless, in *post mortem* examinations, I have seen slight indications of inflammation, where the animal had died from disease of rumen or omasum, &c., shewing that it sympathized, or that the disease extended to it as well.

The omasum, maniplies, or third stomach.—So far as my practical experience and observation go, I can safely affirm or insist that there is no disease, however slight its attack, no injury in any way acute, productive of pain or any slight sympathetic fever, but what this stomach becomes involved in virtue of its sympathy with other diseases. I have never made a *post mortem* examination after death from any disease or serious injury, but the maniplies were either more or less involved. It is, moreover, astonishing how quickly or suddenly such is the case, if the, I may say, mechanical action of this stomach comes to a dead stop directly any serious accident, or even sudden fright, comes upon an animal. If death takes place a few short hours after a serious accident, a considerable portion of the leaves and [illegible] between [illegible] and [illegible] portions, from [illegible] alling will be found hard [illegible] where mischief is taking place. From the kidneys the quantity of evacuation may be the same, but it is much higher coloured and ranker in smell. My attention was very forcibly called to a circumstance which verifies these remarks. In the case of a collision between a passenger and cattle train, where a number of cattle were killed outright, others were slaughtered some time after, and some were treated and recovered, we saw a total suppression of milk take place from the sudden fright almost directly. And although we cannot actually see that the action of the other is stopped, still, from after results and *post mortem* examinations, I can confidently affirm that such was the case at the time; and I can as confidently maintain, that more cattle die through our not having such a command over the stomach as we would wish. Many practitioners remark, "If we had only the same command of the horse's stomach as the human surgeon has over his patients, how many lives we could save," and we may say the same of the maniplies of the cow, for I maintain, that we have no proper power, if any, over any disease whatever with medicine until we have a healthy and proper action and discharge through the stomachs and bowels of cattle by the aid of purgative medicine alone. Hence the necessity in all cases of slight fever—all cases of which have a tendency to run to inflammation as we know; and although the pulse may not indicate the necessity of bleeding, still it must be [illegible] we have a long time to wait before our pioneer purgative medicine has the desired effect to enable us to administer medicine to affect the general circulation or system; and to those who say differently from this, I can only reply, they are altogether ignorant

ttle practice, that there are pure cases
flammation with complete stoppage of
ction or function of that stomach without
ther organs being involved. In young
cks' feeding we have had many proofs
amination after death, or when slaught-
, before death has taken place, where
e purgative medicine and stimulants in
harmacopœia failed in having any effect
the maniplies—which were always found
derably enlarged, hard, and dry, as if
d; and where no medicine nor liquid
d go further than the rumen and reti-
n. The symptoms in these cases are, loss
petite and rumination, the eyes promi-
with occasional flow of tears, conjunc-
nflamed, muzzle dry and hot, ears and
not much altered in temperature, head
ng down, very unwilling to move, and
laying down.

e reader will further note as a symptom
is disease, the most inveterate and
ate constipation; nothing dropped but
is brought away with the hand, or by
id of clysters, and yet the animal will
raining at times; but the fæces are so
and clogged together with a thick slimy
s that the animal seems unable to expel
At times a small quantity of thin
stinking fæces will come away, giving
e that your labours are being now suc-
l; but it is a false hope, and this state
ues till the animal dies or is slaughtered.
e animals alluded to were grazing in
urse of the day, and at night in the fold-
with either wheat, barley, or oat straw, and
ps some turnips. Hoove or blown was
any way a prominent symptom, although
would have expected it. Had these
ls been narrowly examined every day
e cattleman, and before the total loss of
ppetite, they would have been found list-
ot mixing freely with the others, appe-
d rumination feeble, and the dewy nose,
er-failing symptom of something being
, with changeable droppings, much stiffer,
ut scanty in quantity. In such cases this
s the time for medicine to be of any avail;
hen the appetite, rumination, and the
fæcial evacuations are totally suppressed, and perhaps it is some days before these are observed, all the medicine and treatment in the world are of no use. I have seen cases in which a partial use of the functions by the aid of medicine had taken place, but the animals never seemed to do well, and required to be fed on boiled food, with occasional doses of physic, and when in tolerable condition had to be sent to the butcher. I have then, by *post mortem* examination, observed that one-half of the maniplies were in a partial moist natural state, the other hard and dry. I shall conclude this notice by remarking, that the shepherd or cattleman who narrowly watches his flock and herds in order to perceive when any of the least of these symptoms occur, and at once has the animal up and properly attended to as before ordered, is worth his weight in gold to his master.

CHAP. IV.

Spasms in the bowels, or colic, is not a frequent complaint in cattle, although at times met with in hot summer weather, where cattle dairy cows are grazing in fields where water is scarce, and which, in the course of being driven home, get to a brook and drink a large quantity. They are in this case suddenly attacked with excessive pain, pawing the ground, bellowing, running round as if mad, eyes staring wildly. They drop suddenly down on their bellies, jump up quickly, run round, and bellow. They are hoven on both sides. *Treatment.*—Blood-letting; medicine, linseed oil, 1 pint; turpentine, 3 or 4 oz., or the aromatic spirit of ammonia, same quantity; tincture of opium (laudanum) 1 to 2 oz. This is to be repeated, if necessary, following it up with a full dose of purging medicine, as obstinate constipation generally follows such an attack. I may add to the symptoms, as above noted, that at each spasm or pain, the urine and fæces are violently expelled in small quantities. When the bowels are got in proper working order, keep the animals for a few days on boiled food, and allow them to go to full grazing gradually.

Inflammation of the bowels, or what is seen and takes places in actual practice, may exist, (1) in the peritoneal and muscular, or outer and inner coat of the intestines, and which we may term the "acute;" the other in the mucus or inner coat, and which we may call the "chronic." Inflammation in the latter coat may suddenly arise from the eating of any poisonous or deleterious agent, or from giving too powerful cathartics, or from other sudden changes, as of food or of the weather.

The former state of inflammation (1) may also arise from a variety of causes, but we have mostly met with it in long continued hot droughty weather, and in cattle which had been turned on a meadow after being flooded, which when somewhat dried, and no rain occurring, the sand and grit still stuck to the herbage. Whatever the cause, it is somewhat sudden in its attack—so much so, that the attention of the owner or cowman is frequently not called till the animal is seen standing by itself, occasionally moving about, stopping again, striking the belly with the fore and hind feet alternately, indicative of shewing abdominal pain, with tail upraised, occasional straining, rarely laying down; feverish symptoms, legs cold, hard laborious breathing, grunting, or rather moaning; all combined together, shewing acute pain. And, as in all acute cases, rumination and appetite are quite gone, with tympaneium more or less; champing with the mouth, pulse small, thready, and having much quickness; and if the disease is not quickly checked, these symptoms considerably augment, and vary both in kind and intensity. There is also complete stoppage of the bowels, and what is brought away with the hand is hard, sticking together with nasty mucu[illegible] treatment is [illegible] in its fulles[illegible] [illegible] irgi[illegible] [illegible] diarr[illegible] cal[illegible] avoid [illegible] possible [illegible] usual [illegible] drops croton oil, or croton seed powdered 10 or 15 grains. When colicky or griping pains have been present, we have given, and with very marked benefit (although we were almost afraid to give it), linseed oil and turpentine, or the aromatic spirit of ammonia in full doses. We have also applied counter irritants—mustard, cataplasm, with strong ammonia, as before, in disease of the abomasum, and have followed up the same treatment as regards the hoven down, with mucilaginous drinks, &c.

We will now take a glance at the inner coat or inflammation of the mucus membrane; should it be the result of the former being neglected, purging will, in this case, be established, or in other words, diarrhœa or dysentery will set in (with, perhaps, variable or irregular appetite and rumination), accompanied by a nasty strong smell, and the evacuations of a dark black colour. By this time the liver has become affected—in fact, the whole or larger contents of the abdomen are becoming involved, and particularly the maniplies; the pulse even at this stage varies, and though there may be evidently symptomatic weakness, still inflammation is going on and must be put down, and that by bleeding, although this need not be carried out to such an extent as in the former case. However, hardly any rule can be laid down, either as to bleeding or to medicine given; you must be guided by circumstances attendant on the symptoms, which are changeable day by day. Physic we may now vary somewhat, say after the bowels have responded to a full dose, which will be known by the alteration in the colour and smell of the excretion, and which will very likely be more pultaceous—*i.e.*, thicker—or perhaps the reverse. The diarrhœa still continuing, the following may be given:—1 drachm of calomel to 2 of powdered opium and 4 of prepared chalk, well triturated together, and given in thick wheaten or oatmeal gruel. After three or four doses of the above omit the calomel, and add to the other materials extract of catechu 2 drachms. The diet should consist of boiled food, thick bran mashes, wheaten and oatmeal gruel, or the common starch gruel. We have seen good effects result from a few clysters of starch gruel, not overfilling the rectum so as to cause expulsion directly, say one pipefull. This should be allowed to remain, which may be done by keeping the tail pressed on the anus with the hand. On the other hand, after the physic has acted, and if the fæces should be more pultaceous, and more natural in colour and smell, all that is to be done is to keep the animal as quiet as possible and keep to the diet as above named. We have thus far been treating on diarrhœa and dysentery as a purely local affection of the bowels, and not that fatal kind arising from chronic disease of the lungs and other organs, to which we will call attention when treating on the respiratory organs in another part. We have shewn the necessity of a proper and prompt manner of treatment at the commencement, and of being careful not to leave it, as is too often the case, till it is far progressed. The farmer generally gives hot stimulating cordial drinks at the outset of almost every disease, and consequently cattle are liable to serious mischances. If they would take the advice of one who has seen the heavy losses thus caused, they will banish from the premises all such medicines, and those who recommend them. In a future chapter the reader will find a list of medicines and their doses, which the farmer should have always at hand, properly made up by his regular Veterinary attendant, or by a respectable chemist. We need not enlarge any further on any particular or specific intestine, large or small, for there is no particular symptoms that can truly lead one to say such and such a portion of the bowels are affected, the symptoms are all so much alike. To the long-practised eye many things are observed that are impossible to commit in discussion to paper, so as to be fully understood by those not thoroughly cognizant of all the minute changes of symptoms. Enough has been laid down to guide the farmer on the right path.

CHAPTER V.

I now proceed to consider the diseases of another important digestive organ — namely, the *Liver*.

I have already alluded to a juice secreted in the stomachs, called the gastric juice, and one of the principal agents of digestion. The blood, on its return from the different parts of the abdominal cavity, does not go direct to the heart, but goes through the liver, and from which there is another fluid secreted, called the bile; this would be injurious if carried with the blood to the heart. The bile is collected in the gall bladder, and after there undergoing some changes, is carried to the duodenum, or first intestine, where it becomes an aid, or secondary agent, to digestion. Now, if from any cause whatever this secretive process of separating whatever is injurious in the blood, however salutary it may become as an agent of digestion, is increased or retarded, disease of that organ is caused, and consequently disease of the whole digestive apparatus. The above observations have paved the way for me to treat on that disease called *haematuria*, *black water*, and *red water*. And respecting these, my observations during practice have caused me to define in them four different stages The two first I would designate the acute and chronic stages, arising from the same cause; the third, from the after effects of parturition; the fourth, pure inflammation of the kidneys, produced from blows or falls, colds, &c. If with black water and red water, I term the former acute, the latter the chronic; and these occur in all seasons, in all kinds of land, and in all kinds of feeding. Now, when an increase of bile takes place, at the outset, profuse diarrhœa is the consequence, and the urine becomes highly dark coloured, almost black; hence the name "black water." The fæces are very fœtid, rank in smell, the urine is increased in quantity and freely discharged, the breathing is much increased, the pulse is irregular, ears, legs, and horns variable in temperature, but generally cold; the mouth is hot and foul, and the breath nasty; appetite and rumination are irregular or altogether stopped. This is what I term the acute or first stage. If the disease is not at this stage checked, the above symptoms of fever and inflammation quickly increase, the liver becomes torpid, the bile is retarded; the most obstinate constipation sets in; the kidneys more and more participate in the symptoms, and the urine now turns red as blood, and still somewhat large in quantity, but not so freely evacuated. At times there is considerable straining; particles of coagulated blood and lymph will now be discharged; the animal is seemingly weak, but the pulse and other symptoms indicate that inflammation is still going on; and, if not now speedily checked, death soon takes place. The secretion of milk is somewhat suspended, and is of a thin, watery, red appearance, shewing the system at large affected. When such is the case, the udder should be well fomented and well rubbed with goose grease. Treatment, if taken in the early stage, or what I call the acute—a copious bleeding, with a strong dose of physic, generally proves all-sufficient in arresting the progress of the disease. If the first dose does not thoroughly alter the excretions, give another, changing the diet to boiled food, sloppy bran mashes, or boiled linseed. A bucket containing either of the two latter should be kept standing before the animal, but frequently changed, emptying what is left into the pig trough, and well washing the pail before filling with fresh. In all cases the above should be done. If the constipation or second stage has set in, the urine is changed to a blood-red appearance, and although the animal may still appear seemingly weak to external appearance, still the inflammation is increasing inwardly, and must be subdued by a copious blood-letting, following this up with a strong dose of physic, and continuing this until the bowels are thoroughly opened by giving half doses every six, eight, or twelve hours. When the bowels are well opened, the urine will be getting of a paler [illegible] natural in appearance; [illegible] coagulated [illegible] indicating that the [illegible] contractile power, and [illegible] to 4 ounces [illegible] linseed [illegible] sufficient to arrest the [illegible] I had to repeat the [illegible] full dose; but until the [illegible] opened it will be productive of much harm if administered earlier; keep the bowels, when once going, regular, by the food as above ordered. If again inclining towards constipation, give the animal a half dose of physic. Such is a general outline of the treatment to be pursued in abating or preventing the inflammation from spreading; by a full copious blood-letting, get the digestive organs in proper trim, and all will soon be well. Pay careful attention to the diet for some time after, giving plenty of mucilaginous drink, as linseed tea, bran, &c. I have made no allusion as to what may be the cause of the above disease. I have had cases very prevalent in different localities, both in lean animals and those in good condition, and without any specific cause.

In connexion with the above, at least arising from the same obstruction of the bile, we have *jaundice* or *yellows;* there is either torpidity of the liver, or the bile is obstructed in its course from the liver to the gall bladder, or from the latter to the duodenum or first intestine. In *post-mortem* examinations we have found the liver of a dirty pale colour, or completely rotten, the duct or vessel which conveys the bile to the intestine very much enlarged and choked up with thickened bile, the kidneys also disorganized, the whole intestinal canal partaking of disease, especially the first intestines, duodenum, jejunum, and ilicum. This disease generally comes on gradually, the appetite seems irregular (with secretion of milk also irregular, and is thin). At one meal the animal takes less, at another time more. The coat or hair stands on end, or, in other words, is an unthrifty staring coat. Bowels not regular. These symptoms may continue, and as there may seem not very much the matter, the evil day is put of, until the animal is found scarcely able to move, yellow all over, and which is best seen in the eyes, and inside of the ears, the former very protuberant. There is also a quick and hard pulse, which can scarcely be felt, with difficult breathing, heaving at the flanks, rumination, and the milk suspended, and what can be got of the latter is thin, watery, and of a yellow appearance, and there is hoven less or more occasionally. There is, as usual, also obstinate constipation; the urine is, when discharged, increased in quantity, but freely, and very much coloured. The appetite also is lost, with this exception—the animal will drink freely; but this is a fortunate thing as regards the treatment. These symptoms tell us that the liver is gorged, that there is congestion of the lungs, and that the process of digestion or the peristaltic motion of the stomach, &c., is suspended.

The next point that demands the attention of the farmer is how to treat the animal:—*Treatment:* Get the animal removed in-doors as quickly as you can. Bleed largely until the animal breathes more freely; but in this the pulse is the best guide. Bleed, then, until it gets softer and fuller; but the breathing is also a good guide, especially to those who do not very well understand the pulse. Then follow up with a full dose and a-half of purging medicine, and continue half-doses every six hours until the bowels are thoroughly set a-going. If at hand, in all cases when obstinate constipation is present, add ten to twenty drops croton oil, or the same number of grains of the powdered seed; and while the inclination to drink lasts, allow plenty of gruel, linseed tea, and sloppy mash. I hardly need allude to the necessary assistance of back-raking and clysters. If we only can but empty the rectum, that is some little help. After the bowels are well opened, should any feverish symptoms continue, give the following:—Gum-camphor rubbed down with a little spirits, 3 drachms; digitalis, ½ drachm; pulv. pot. nit., powdered saltpetre, 2 drachms; acetated liquor of ammonia, 2 to 4 oz., in a strong decoction of camomile tea, morning and night. From the quantity of medicine given before purging commenced, and which may now be too free, you may give from ½ to 2 drachms of powdered opium in some thin starch gruel, or from ½ to 2 oz. of the tincture. I have given, and I think with considerable benefit, dandelion roots, cleaned, chopped up, and well boiled. Strain, and give the liquor. Should much weakness supervene, and the appetite not be as one would wish, you may give the following tonic:—Sulphate of iron, pulv. gentian, pulv. ginger, of each ½ oz., given in a pint of good ale, or decoction of camomile or dandelion tea twice a-day; or if the purging, or I may say state of the bowels, will allow, a handful of grass, a piece of carrot or turnip occasionally; and when the animal seems fit, turn it out for an hour or two, and so on until it is convalescent. In some cases the disease does not assume the acute form just described, and I think that much depends on the condition of the animal at the time. An animal in full condition is more liable to inflammatory diathesis than one in low condition; on the other hand, the animal in good condition is more able to stand against a putrid diathesis to which this disease soon leads, than the one in low condition. I have already alluded to the gradual progress of the disease, before suddenly breaking out in a general inflammatory fever or diathesis, or disposition in an animal in full condition. In the animal in low condition, the disease gradually steals on: there is the unhealthy staring coat, yellowness of the body, &c.; the appetite and rumination is variable—eating and ruminating one day, another day both are gone, and so on; also the secretion of milk is one day pretty full, next day little or none. The udder should be well fomented thrice a day, and well rubbed with some goose grease or oil, and drawn as usual. The action of the bowels is not altogether suspended, but the droppings are in black hard masses, covered with nasty yellowish mucus. At one time the bowels are slightly loose; the next time, as above, the urine is increased in quantity and yellowish, the pulse is low and weak, the breathing is slightly disturbed, betokening weakness more than anything else. Now, the acrimonious state of the blood, from the bile not being separated from it, or from both conjointly, or from the imperfect separation, leads more easily in animals in low condition to fever of a putrid disposition or diathesis. The above symptoms will vary and continue for some days, until a violent diarrhœa or dysentery sets in, that defies, in many cases, all treatment to stop it. Now, in such a case, what is the treatment to consist of? Well, there is plainly fever, although of a low putrid type. Now, if the appetite is not entirely gone, I have never hesitated in bleeding to a moderate extent, and with decided benefit; at the same time, it requires great practical discrimination. As regards medicine, a purgative must be given, and in a dose as follows:—Sulph. magnes. (Epsom salts), 8 oz.; sulph. sub. (sulphur), 4 oz.; pulv. zingib. (ginger), ½ oz.; pulv. gent. (gentian), ½ oz.; acetated liquor of ammonia, 4 oz.; dissolve the powders in a strong decoction of camomile or dandelion liquor; but as there is little time to wait for that, in boiling water, say 1½ pint, the camomile is an excellent mild tonic. The dandelion is well known for its action on the liver, and as a tonic. I have not as yet had an opportunity of trying the extract of dandelion—taraxacum—but from the good effects of strong, well chopped up dandelion tea, it might be useful, say in 2 oz. doses, which will have an effect in changing the action of the bowels, which will be known by the difference in smell and colour of the fæces, and, what is much to be wished, a diminution in quantity and looseness. However, should the quantity and its watery looseness still continue, if the smell and colour is changed to a more natural state, we have done wonders, and may now have good hopes. If there is any appetite for food, a few boiled turnips, beans, barley, clover, chaff, mixing liquor and all in bran, may be given, but give sparingly. The appetite for water will not be diminished, at least in most cases the thirst is very great; instead of water, give linseed tea well boiled to a jelly, mixed with oatmeal, or wheaten gruel. But, although grass is the natural food for cattle, still [illegible] such cases we must be very careful [illegible] bowels seem [illegible] and [illegible] ne [illegible] and [illegible] gradually [illegible] elapse, and [illegible] generally worse [illegible] liquer than the [illegible] attack from so doing [illegible] not be in too great a hurry; never mind the trouble in cooking the food, [illegible] will be [illegible]; if the appetite is so that the animal will take it, that will soon cause the loose watery fæces to become more pultaceous or thicker. On the other hand, if not so, and the looseness still continues, astringents must be given. At the same time, as I have said, if the smell and colour of the fæces are changed by the physic to a more natural state, I always like to try the effects of *tonics* for a few days. The former recipe for tonic draught is astringent; a substitution of sulphate of copper, 2 drachms, for the iron may be advisable. It matters but little, still I was in the habit of changing the medicines, if they had the tendency to produce the same results daily, and with good effect. Still, should the looseness or dysentery continue, the following may be given:—*Astringents*—Prepared chalk, 2 to 4 oz.; extract of catechu, 1 to 2 drachms; powdered opium or substitute, 1 to 2 drachms; tincture of opium, 1 to 2 oz.; dissolved in a little warm water and mixed in some starch gruel, to be given twice a day, morning and night. And to increase the appetite and strength, *give in the middle of the day—astringent and tonic*—sulphate of copper or substitute, 2 drachms; sulphate of iron, 2 to 4 drachms; powdered gentian, 4 drachms; powdered ginger, 4 drachms; dissolved in camomile tea or water, and mixed in some starch gruel or wheaten flour gruel; or say, give the copper one day, the iron the next, or you may alternate with the above diniodide of copper 1 to 2 drachms, or iodide of iron, 1 to 2 drachms, substituting as you please one for the other, any of the four at each dose. I am no advocate for the use of calomel indiscriminately, unless prescribed or given under the eye of the thoroughly practical man; at the same time, should you think that the action of the former purgative had failed sufficiently to stimulate the liver, you may give three or four times in starch gruel the following:—Calomel, 1 drachm; prepared chalk, 1 to 2 oz.; prepared opium, 1 to 2 drachms, in a little starch gruel, triturating the powder in some warm water first; to be given once a-day for three or four days. In some cases, I have seen great and decided benefit from it; on the other hand, I have

lecided injury from its use. Much de-
on the state of the liver, and that is
sy to know. You cannot, however, be
reful in the administration of calomel.
know this will apply to my former
ng it to be given in other cases. Starch
rs, in which a little laudanum, tincture
ium, is mixed, will be found of good
in such cases. First, empty the gut or
n with a pipe-full or two of tepid water,
nject a pipe-full of the starch and opium
re. Let the animal be quiet, so that it
remain some time, or keep the tail
d down with the hand. Such are the
l rules for the treatment of a very for-
le and dangerous disease. Great care
e taken in the diet for some time, not
g the animal out too soon, nor too long
me; keeping it up in wet weather, or
colds sets in. As the organs are much
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e inflammation of the liver, unaccom-
d with disease of other organs, is not of fre-
occurrence. I believe few cattle die of
lisease but what the liver is affected
or less, and I might, with safety, make
me remark as regards cattle which are
tered, especially dairy cows or aged bul-
and yet, during life, they may have shewed
mptoms of anything being particularly
atter with that organ. Cattle fed on oil-
have generally a yellow colour of the
eyes, and inside the ears, so that, if
vise in health, that is not in that case
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Still, there is a peculiar difference in
lour under disease of the liver, &c., dif-
from that named above, but which I can-
ll describe here. When slaughtered, you
ll by the colour of the fat, and its soft,
feel, that oilcake has been largely used
like the clear white and firm feel of the
cattle fed otherwise—this being, in my
n, not nearly so healthy or nutri-
as the latter kind of fat. However,
se of oilcake has this advantage,
from its laxative nature, it keeps the bowels, &c., pretty regular, and it is a preventive against disease of the digestive organs to which stall-fed cattle are liable; but I would much rather prefer an occasional dose of physic for the purpose. As I have before remarked, pure or acute inflammation of the liver, unaccompanied by disease of the other organs of digestion, is not of frequent occurrence, nor are the symptoms so very well defined as in some cases. There is the yellowness of the skin, and as in the other cases we have described, but not so well marked; also the usual fever symptoms, but not in so great a degree, owing, as I suspect, to the absence of any acute pain. There is a peculiar languidness about the animal, considerable stiffness in the fore extremities, more especially on the right one, accompanied with occasional shivering or trembling of the whole limb, especially of the shoulder. At times the animal seems scarcely able to walk; the appetite is impaired, but not to such a degree as one would expect. Rumination is variable, secretion of milk the same, and thin and changed in colour; the urine is also high coloured, the fæces are of a light brown or darkish colour, sometimes softish, again hardish, not discharged in a mass, but as so many flat pellets glued together, with a nasty slimy yellow mucus, sometimes of a bloody streaky appearance; there is also the unthrifty appearance of the coat-hair standing up, and if pressure is applied to the right side the animal grunts and looks round from pain. The same, however, is present in the preceding cases. Although the pulse may not indicate that much blood-letting is required, if it is not a sinking pulse, I always bleed and find decided benefit from the practice, following it up with the usual full purgative and a-half; also, if required, every six, eight, or twelve hours, with quarter or half doses, until the bowels are thoroughly opened, changing the food, as ordered elsewhere. A large mustard cataplasm should be applied, in which a little strong ammonia is mixed. With such treatment all is soon right. In a large whisky distillery which I attended, and where from 100 to 200 beasts were

fed, such cases were very frequent. The animals were fed on the burnt ale, as it is called, the residue after the distillation, the grains or draff, with occasionally barley or oat straw and a few turnips: but the principal food was the two first-named articles. There was not so much febrile excitement; in fact, there was not time allowed for the disease to reach any height. As soon as the yellowness in the skin made the least appearance, and the alteration of the fæces, with the least disinclination for food, treatment was had recourse to directly: a full bleeding, a dose and a-half of the usual purgative was administered, and the animal was in a few days in its usual health. In the course of feeding, the same animals might have a return of the same symptoms before being fed off, and the same treatment was continued. Now, these animals may have had, when purchased, chronic disease of the liver; the change to highly stimulating food, the want of exercise in the open air, as when grazing—all had a tendency to produce enlargement or engorgement of the liver. Now, in this and in the preceding cases, the liver is likely to become of that soft, light, or dark-yellow appearance, or half-rotten state, so often seen (of course after death), that the administration of calomel would only have the tendency still more to increase than allay this state. On the other hand, induration or hardening of the liver may take place instead, when calomel might be given with benefit; but it is only by long practical acquaintance and experience amongst them that one can truly say such and such is the case; and such are the peculiarities in the symptoms, that one cannot describe them on paper, so that it is safest for the non-practitioner not to administer calomel at all. In [illegible] state the fæces should be always [illegible] hardish slimy, or, [illegible] inclining to [illegible] appear- [illegible] purga- [illegible] animal [illegible] ing [illegible] always be [illegible] more especially [illegible] the cons[illegible] sympathy that exists between the different organs, so that one organ will not be long in a state of disease before another is attacked. And, again, few cattle (and the same in horses) reach the fifth or sixth years without chronic disease, more or less, of the lungs, liver, &c. A regular attendance at the shambles or slaughter-houses, and at the knackers, will verify the above; and yet the animal may not have been known to have had any acute illness—perhaps an occasional cold or catarrh now and then. Knowing all this, bleeding will, therefore, be seen to be a great preventive of disease spreading in the system, for when once any organ is in a chronic state of disease, it requires but little to set it agoing acutely. Every one at all conversant with cattle knows that few animals from yearlings—aye, from calves—but what carry with them through life a hoost—*i.e.*, cough—the effects of disease, slightly perhaps at first, of the bronchia, in the lungs, and which soon affects the parenchyma as well. So to the practical man there cannot be two opinions about the necessity of bleeding in such cases as we have been treating, or in most others.

Nephritis, or inflammation of the kidneys, is not of frequent occurrence; and happily so, for when it does occur, and is neglected too long (as I am sorry to say is the case in almost all cases before help is called in) general inflammation arises, and death soon takes place; or so much disorganization takes place in the kidneys, and also from the intestines participating in the inflammation, that a chronic diarrhœa or dysentery sets in, which it is very difficult to check. The animals are never of much value after, at least there is no possibility of getting any flesh on them, after being too long neglected at first. This disease generally attacks animals who are feeding too rapidly, or are in full condition, especially after galloping about, perhaps straining the parts by slipping, exposed to cold rainy weather after very hot and dry weather and scarcity of water. Bulling by a heavy bull, and the cows knocked about a good deal after, we have known to be the cause. The disease is first observed by the animal's back being, I may say, continually arched, and

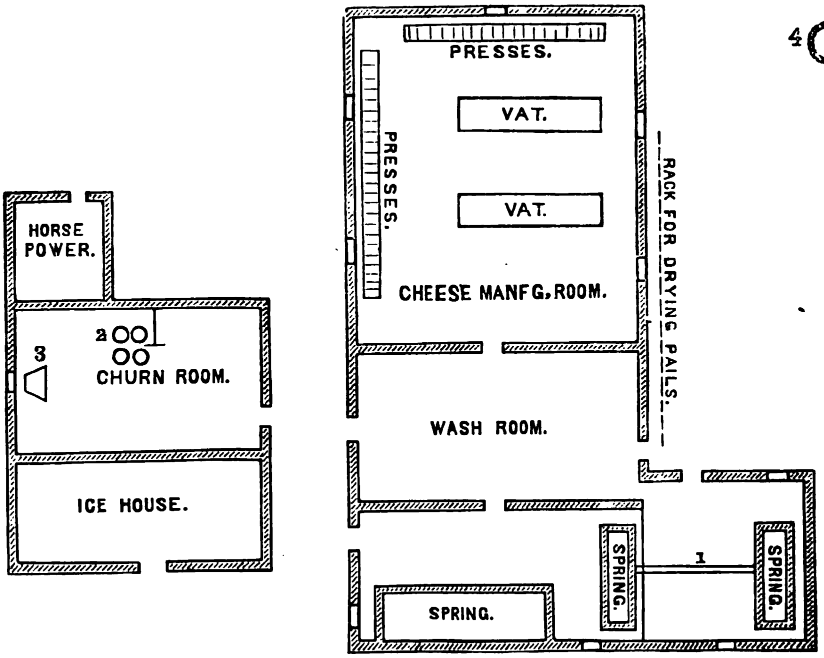
straining to make water, their fæces and
being discharged together, or rather
d in small quantities every now and
Pressure applied to the loins shews
tenderness, the poor animal will almost
to the ground. On an examination,
ctum, the parts will be found very hot and
n, with great pain and tenderness on pres-
the animal feeds sparingly, or it may be,
s food altogether, the fæces get liquid,
the inflammation increases constipation
, the breathing is much quickened, pulse
wiry, and much quickened, with the
acute inflammatory symptoms. If no
is soon given, these symptoms increase,
ine is discharged with greater pain and
lty, is very high-coloured, bloody in
rance; general inflammation then sets
d the animal is soon carried off. The
ent must be quick and decisive: blood-
as much as the animal will bear, full
and a-half of the usual purgative;
astor and linseed oil, I know, are re-
ended in this disease on account
eir emollient properties. I always
the salts and sulphur, trusting for the
by horning down plenty of well
linseed to a fine thick jelly, or plenty of gum arabic dissolved in water. But as there is generally great thirst, keep a pailful beside the animal, and withhold water. A mustard cataplasm should be rubbed well in across the loins. Clysters will be here useful in two ways—first, as an inward fomentation to the parts; and, secondly, as assisting the physic, which is much wanted, as the constipation, when set in, as in almost all other cases, is very obstinate. If the first dose does not take effect in twelve hours, give another half dose, or if you prefer it, give a pint of linseed or castor oil; the ginger, which is always given in this as in all other acute inflammatory disease, had better be withheld, or, when constipation has set in, and cannot well be dispensed with, half the usual quantity had better be given as a sedative, and given with purgative; or, to allay the irritation, give it occasionally, with the linseed tea, extract hyoscimus, or extract of henbane, one to two drachms, dissolved in a little warm water. The bleeding may have to be repeated, but after one full bleeding, and getting the bowels well opened with the counter-irritants, things generally go on as well as can be wished. All depends on the time these are applied.

The Dairy and Poultry-Yard.

AMERICAN DAIRY FACTORIES—THEIR ARRANGEMENT AND MANAGEMENT.

NO. I.

CONSIDERABLE discussion has taken place of late as to the dairy factory system of America. We are indebted to one of the Reports of the New York State Agricultural Society for the following illustrations of factories, which are looked upon as fair specimens of good arrangement. The first of our illustrations is the ground plan of the Wallkill Butter Factory, in the state of New York. The main building consists of a two-storeyed structure, arranged on a plan similar to our cheese factories. Below are the vats, presses, &c., for making cheese, and above is the drying-room. On one end of this building is erected the spring-house, containing two rooms, the one 12 feet by 16 feet, and the other 14 feet by 24 feet. It has windows and doors for ventilation. The packing and churning-room is a separate building, 12 feet by 24 feet, and stands opposite the spring-room, with a narrow alley between. Adjoining to, and connected with this is the horse-power for churning and a store-room. The establishment receives the milk from 400 cows, and after the cream is taken from the milk, the milk is made up into skim cheese.



1. Pipe for leading water. 2. Churns. 3. Butter Worker. 4. Whey Cistern.

The springs, and manner of treating the milk.—There are two springs in the spring-house, one is of soft water and the other happens to be slightly tinctured with iron. Vats are constructed about the springs for holding the

. They are three in number, 12 feet)y 6 feet wide, set down even with the and with racks in the bottom for hold- ne cans. The water flows up through racks and above them to the depth of ches. The pails are 22 inches long and es in diameter, and as fast as the milk eived they are filled within 5 or 6 s of the top, and immediately placed in ater. Care is then taken that the sur- of the milk in the pails is not above of the water in the spring. The pails et close together, and one spring will 2040 quarts of milk. The spring l have a sufficient flow of water to divest ilk of the animal heat in less than an Mr Slaughter regards 56 deg. as the st temperature that the water of the should be for conducting operations ssfully. He has not yet determined the e temperature of water best adapted for ing the most cream from the milk, but is ed from his experiments that the natural rature of the water should not be below g. nor above 56 deg. He says more , and that of better quality for butter g, can be obtained by setting the on the above plan, than in shallow The object is to expose as little of rface of the milk to the air as possible, at surface should always be in a moist phere, in order that the top of the may not dry, which has a tendency to he butter and injure the flavour.

e milk of one day is left in the spring ext morning, when it is taken out, the dipped off and put immediately in the s. In removing the cream a little funnel- d cup, with a long upright handle, is It is gently pushed into the pails and am dipped off. It is very expeditiously d, and the milk line easily determined appearance of the milk. The cream, fall of the year and in the spring, rned sweet. In summer, the cream is l into the same pails, and returned to ring, and kept there until it sours. As the cream is removed, the milk in the is emptied into the vats for making heese.

The churn-room and churning.—The churning is done by horse-power. The churns are the common barrel and a half-dash churn, four in number, and are placed on each side of the power, so as to be all worked together. About 50 quarts of cream are put in each churn, and each then receives a pail of cold spring water, and the mass is brought to a temperature of 63 degs. to 64 degs. In warm weather ice is sometimes broken up to put in the churn to reduce the temperature to 56 degs., but it is deemed better to churn without ice if the cream does not get above 64 degs. in the process of churning, as butter made with ice is more sensitive to heat. It is, however, a lesser evil to use ice than to have the butter come from the churn white and soft. It requires from forty minutes to an hour to churn, when the butter should come solid, and of a rich yellow colour. It is then taken from the churns, and thoroughly washed in spring water. In this process the ladle is used, and three times pouring on water is generally all that is required. It is then salted, at the rate of 1 lb. 2 ounces of salt to 22 lb. of butter. In making winter butter a little more salt is added at the last working. The butter, after having been salted and worked, is allowed to stand till evening, and is then worked a second time, and packed in 60 lb. pails, and shipped twice a week to New York.

At this factory, in hot weather, after the butter is salted and worked over, it is taken to the spring and immersed in the water where it remains until evening, when it is taken out and worked over and packed. For winter butter, a small teaspoonful of pulverized saltpetre and a large table spoonful of white sugar are added for the 22 lb. of butter at the last working. No colouring matter is used in butter at this establishment.

The butter is worked on an inclined slab, with bevelled sides running down to the lower end, and within 4 inches of each other. A long wooden lever, so formed as to fit in a socket at this point, is used for working the butter. It is a very simple affair, and does the work effectually. In churning, the dashers are so arranged as to go at every stroke within a quarter of an inch of the bottom of the churn, and rise above the cream in their upward stroke.

When butter is packed in firkins, none but those made of white oak are used. These firkins are very handsomely made, and are tight, so as not allow the least leakage. Before using them, they are soaked in cold water, and after that in hot water, and then again with cold water. After being filled with butter they are headed up, and strong brine poured in at the top to fill all the intervening spaces. The pails for holding the milk in the springs are thoroughly cleaned with soap, rinsed in spring water, and put on a rack to dry. In furnishing a factory, two pails are allowed for each cow, and it is necessary to have a double set.

The cheese.—In making the cheese, the milk is set at 82 deg., highest heat 96 deg. to 98 deg., and 3 lb. of salt to 100 of curd. The curd is pressed in 16-inch hoops, and cheese made about 4 inches high. We bored a number and tasted their quality; they are of very good flavour, and by no means unpalatable, though, of course, inferior to pure-milk cheese. These cheeses are shipped to warm climates, and many of them go to China, in exchange for tea. Their value has been constantly increasing, as the markets have been opened for this character of cheese; and it has sold this year for as much as best factory whole-milk cheese, and sometimes in advance.

It is believed, if the quantity could be increased, other markets would be opened, so that the cheese would always sell for as much as the pure-milk cheese, and perhaps in advance of it, since it seems to be better adapted to warm climates, and better suited to the tastes of people living under a burning sun, where less fat is required than in our cold climates.

Record of results from a given quantity of milk.—Mr Slaughter has only from time to time made a record of a single day's work, his books being arranged for monthly statements. Among the single day's results are the following:—

On May 18th, from 3512 quarts of milk, wine measure, there was produced 213 lb. of butter and 560 lb. of cheese; May 26th, from 3300 quarts of milk, 210 lb. of butter, and 550 lb. of cheese; September 12th, from 3128 quarts, 200 lb. of butter and 546 lb. of cheese; October 14th, from 2025 quarts of milk, 120 lb. of butter and 407 lb. of cheese.

Take the result, for instance, of May 18th. The 3512 quarts of milk by the old system, would make, say 800 lb. of cheese, which, at 18 cents., would come to $144.00. But by the Orange county process, 213 lb. of butter, at 70 cents, comes to $149.10, and the 560 lb. of cheese, at 18¼ cents., comes to $104.60, or for both, the sum of $252.70, making a balance in favour of the Orange county farmer, on the same quantity of milk, of $108.70. Does not that seem too much to lose?

In the above estimate, we have made a very liberal allowance for the quantity of whole milk cheese to be made from 3512 quarts of milk; the average at factories from this quantity of milk would hardly exceed 760 lb. cheese.

[illegible] FOR MARCH.

[illegible] were last month, so that the henwife will not now be compelled to take the first she can get, but make her choice: a steady, well-feathered, short-legged, plump hen will doubtless be selected; and if she has already fulfilled well the duties of maternity, so much the better. Dorkings she will probably prefer; they sit early, and remain long with their

:kens. The kind of eggs set will depend vhat pullets are required. If Cochins are they will lay early in September, and tinue to lay all winter; Dorkings and nish in November. The eggs, of what- : kind, must be fresh—not more than a night old. They should be kept in bran . warm place, with the pointed end under- it. Before setting them, it will be neces- ' to examine them, by holding them be- en the eye and the sun, or a lighted dle or gas, having the broad end of the encircled by the lower part of the hand. he egg is clear throughout, it is unpro- tive; if the air-bag crown is distinctly ble, it is fit for setting. Sometimes the vn is on the top of the egg. In this case, said the egg will produce a cock chicken; etimes the crown is at the side, and then ill produce a hen chicken; but for the h of this theory the writer cannot vouch, having yet tested it. The number of set will depend upon the size of the hen the season of the year. In March or il, a good-sized hen may cover twelve or een eggs. In January and February, n the frost and snow may be expected, number may be considerably reduced: nth being indispensable to the growth chickens, it is important that the hen ild have no more than she can cover erly. When the brood is too large, the ide chickens get chilled. They squeeze nselves in, and force out others, which in turn get chilled, till the whole in succes- suffer, and, in consequence, they either p and die, or grow up dwarfish and stunted things. And it must be kept in mind that very early chickens attain a considerable size before the setting-in of genial weather. Allowance must be made for this, in calculating the number which the hen can cover, for it is better to have a moderate-sized brood, and rear every one, than see them in succession droop and die, which they are sure to do if not thoroughly protected by the mother hen during the long cold nights of early spring. When *turkeys* are kept on a large scale, they are not set until the whole flock have ceased to lay, as it is of consequence that all should be hatched together—the practice being to entrust two broods to one hen. The turkey hen is such an assiduous sitter that she would not of her own accord leave the nest during the whole time of incubation. It becomes necessary, therefore, to remove her daily, for the purpose of feeding her, otherwise she would either starve in the nest or lack the warmth necessary to bring out a brood. On the 26th day the eggs must be examined, the addled ones removed, the hens well fed, and not disturbed again till the poults are hatched and dried, which will be, the former about the 27th or 28th day, the latter, 24 hours after leaving the shell. During that time they require nothing but the mother's warmth. If exposed to cold before being thoroughly dried, they will undoubtedly perish. The turkey hen may have fifteen of her own eggs; if set on hens' eggs, she will cover twenty or upwards. The cock must be kept at a distance, otherwise he will be sure to kill the poults.

DAIRY CATTLE.

ROFESSOR BREWER, in addressing a meeting of the American Dairymen's Association, at Utica, remarked that cheese-making appeared m, as both an experiment and a branch of estab- l industry—an experiment, when considered more ially in its *details*; an industry, and that of a established character, when viewed as to the vast niary interests connected with it.

Division of labour, by which the present age is characterized in such a remarkable degree, exists less, perhaps, in agriculture than in any other department of industry; and knowing that farmers, who are ever ready to accept and test improvements in farm machinery, should be equally anxious to avail themselves of the improvements offered in the matter of raising stock, introducing plants, and bettering land, and its ower generally. As regards the rearing th its relation to the making of cheese and obvious that cheese manufacturers must ir judgment, and give preference only to ls capable of supplying the most and best a given quantity of milk. Cattle, it is , have been domesticated from the earliest therefore, there have been all along eds. Our present use of the term "breed" ue. If we place a number of wild animals l space, very little variety of breed will be but if the same stock be allowed to spread area, many different kinds will be de- m the fact that they are permitted to live nt conditions, eat various kinds of food, ssume quite a separate character; but nature itself altogether effect our purpose. We a *selection*, and "breed to a point"—that some special characteristic in an animal. e, cattle were originally used as beasts of therefore of necessity required to be strong whilst we, on the other hand, desire that produce milk and beef, and with that view e bred accordingly. Special breeds are n a particular locality, their characteristics local wants; and when different breeds are offspring will exhibit the points of excel- h. No great dependence can be placed ou of mixture of the second generation. breeding, the milk of the cow either for its quality or richness. The slands, for instance, are more especi- l for the production of butter, whilst great paid to the milking properties of the reed. The latter are small, live in short d give large quantities of milk, considering their size, and the nature of the food they eat. The Ayrshire cows, too, are good milkers; six hundred gallons of milk being a fair average for these, in a dairy of thirty and forty. Also, the Bretons of France have an excellent breed for milk. There is one instance of a cow producing eight times her own weight of milk during a year. These cattle are not so valuable when taken to other localities; they derive their characteristics from the condition of that country, and from the peculiar needs of the people.

These facts shew that there is still a wide field for improvement, where farmers might experiment with profit. The reason why no attempts have been tried to make a breed of cattle is very obvious—because no object has presented itself which might tend to stimulate action in that direction. Such now, however, has been found. In cheesemaking, we recognize a most important branch of business; and to form a cheesemaking breed of cattle is a work definite and to be accomplished. There is no danger of overdoing it. If the farmer makes his cheese of the best quality, he will always find market for it. There is no room nowa-days for a poor article, whether it be produced by an individual or by a community. If farmers wish to gain the greatest profit in this business, they must invariably produce the best article; and in order to accomplish that end, attention must be paid to all the different materials from which the cheese is made. It is not enough to improve the mode of making cheese from milk: the milk itself must be improved, the animal must be improved, and made the best possible, the same as the apparatus in a factory must be the best. Attention must be paid to breeding, so as to obtain a *cheese-making* breed of cattle. The professor closed by urging the importance of the subject upon the attention of cheese-makers generally.

The Naturalist.

S OF A JOURNEY FROM DERYAH DHOON TO JUMNOTRI.*

BY MR WILLIAM BELL.

VING some leisure time in October last
1868), it occurred to me that I could not
t more pleasantly or more profitably than
ing the famous boiling springs on the
Jumnotri. Accordingly, accompanied
Nelson of the Saharunpore Botanic
, I left the Deyrah Dhoon about the 1st
r, and reached Jumnotri in ten or eleven
On account of being rather pushed for
e walked double marches both there and
nd what made matters worse, food was
arce and bad. We expected, that after
over the third range, well away from
rie, game would be tolerably plentiful;
r, in this, we were sadly mistaken. In
illage that we passed through, however, we
ne or two men who made a living by the
llecting pheasants (chiefly Monaul), skins,
usk, gives employment to a great many.
ard of a Mr Wilson who has amassed a
d fortune from the proceeds of the skins
sk which he sends to the London mar-
or the purpose of collecting these, he is
employ no fewer than eighty men. Mus-
s also tolerably well supplied with game
the summer season, but it has to be
t from a great distance, as it is not to be
hand. Many gentlemen employ a man
sole purpose of supplying their tables,
se men spare neither age nor sex ; and
akes matters worse is, that the time when
s in greatest demand, and of course the
t quantity killed, is during the breeding
Such being the case, it is not surprising
me of the fine Himalayan pheasants in
istrict are fast becoming extinct. The
lass of men, both on the hills and on the
(who are thus destroying the game), have
ittle to do with that pernicious system of
urning which has already done so much towards the ruining of the Indian forests. The northern slopes of the first, second, and third ranges are pretty well covered with oak and rhododendron, while the southern slopes of the second and third ranges are extremely bare, with only here and there a few starved-looking Euphorbias, Viburnums, &c. In some of the large ravines there are a few stunted trees and scrub. These ranges have all seemingly, at one time, been cultivated to their very summits, by a system of terracing ; but these are generally so badly constructed that the soil gets washed down. Many of the fields now in cultivation have exactly the appearance of a newly metalled road, the soil having all been washed away and only the stones left, the whole presenting an appearance very similar to that of a mixture of sharp gravel and road-metal. Land in such a state seems quite unfitted for rice or wheat, which is generally cultivated on land close to the villages, better levelled and better manured. For rice cultivation, the villagers seem much more careful in terracing, levelling, and constructing water-courses, than for cultivation of any other kind. On those fields where the soil has been partially—in some cases it might be said wholly—washed off, Panicum, Phaseolus, and Amaranthus (several varieties or species), thrive most surprisingly. All of them are remarkably handsome, but particularly so is one of a deep purplish colour, with long pendant spikes 1½ to 2 feet in length. On the third and fourth ranges, patches of forest of considerable size are cleared for its cultivation. Its peculiar colour attracts notice at a considerable distance, contrasting markedly with the green all around. Still further back, and at higher altitudes, the common buckwheat, and also a chenopodium, are extensively cultivated. The leaves as well as the seed of the latter are used. What its specific name is, I have no means of ascertaining. There has lately been a great deal of writing and talking about the great advantages likely to be derived from

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d before the Edinburgh Botanical Society on
February.

the introduction of Chenopodium Quinoa, a South American species. It is a matter for surprise, that those gentlemen who expect such great things from the introduction of the American one have given no comparative statement of the different values of the two. It would be highly interesting to know in what respects it surpasses the Indian one. Is the introduction of C. Quinoa, as some already suspect, only another case of shipping coals to Newcastle? It seems a little curious that the Indian one should be extensively cultivated on the ranges just under the snow, and no notice whatever taken of it by those who cry up so loudly the supposed advantages to the hill districts of the American plant. If it be all that it is said to be, its introduction would be a great advantage, if for nothing else than cattle feeding. In many of the villages, they have nothing during snow-storms for that purpose, except oak and mulberry twigs, and the leaves of a ferula. A stem of the latter, that had been broken about the middle of the internodes, presented a rather remarkable appearance. The break was about 5 inches above a leaf, and as much beneath one, and from the broken surface (not from the axil of the leaf beneath) arose a great number of buds, some having two or three minute leaves on them. It looked exactly as if they had sprung from the ends of the broken vessels.

The further back one goes, the more steep do the southern faces of the ranges seem. That is most observable where the rock is buartzose. They are also drier, as the strata all dip north or north-east; and the flatter, better wooded, and better watered do the northern slopes become. Some of the precipices along the course of the Jumna look really frightful; some of them I would guess as being considerably more than 1000 feet—almost perpendicular walls of rock. The waterfalls, too, must be really grand during the rainy season. There cannot be any great body of water rushing over them; still their great height will always render them striking objects to the tourist. Some of them have perhaps not less than 500 feet of an uninterrupted fall.

It is not until after crossing the third and and fourth ranges that the Deodar, Abies morinda, and Pinus excelsa are observed. Pinus longifolia covers some of the slopes exclusively. It also occurs on the Sewalick range, and likewise does well on the plains. In those districts where it occurs, the collecting of resin from the growing trees, by barking and charring them, seems to form no inconsiderable branch of industry. On most of them the foliage gets a yellow colour after the bark has been stripped off at the base, for about one-half the circumference of the tree, and a fire applied. Judging from the great number of fine trees on the ground, such a practice seems to be a little injurious to their health and longevity. At one place, on the banks of Jumna, a considerable deal of felling had been done, and, judging from the great length of the stumps left standing, that must be rather difficult work. Neither do the fellers seem to have troubled themselves much about the direction in which the trees came down. Like most else that natives do, it seems entirely left to fate: whether they smash other trees in their fall, or get smashed themselves, it is equally a matter of indifference to them. If a tree will fall in one direction rather than in another, it is not in their power to prevent that, even if over a precipice, and the trunks get cracked and splintered: there are plenty more equally good, why trouble themselves about such a trivial matter as that.

It has been already remarked that, on account of the steepness of the slopes where terraces were badly constructed, the soil soon gets washed away. In many places, terraces are not constructed at all, and where such is the case, cultivation is carried on for two or three years, and then a fresh piece of forest cleared. The system of clearing practised, is to girdle the trees, lop off the branches, and allow the trunks to remain standing. These operations are generally performed the year previous to breaking up. Oak seems to stand such hard usage much better than pines. The former sometimes recovers from such treatment, while the pines never do. After the oaks have been headed over and girdled, an insect—I cannot say whether a beetle or a grub attacks them most vigorously. Handfuls, of gnawed wood, resembling sawdust, may be gathered up round the roots of the tree. Under such a vicious system, it is not a matter for surprise that large tracts of forest are fast disappearing. Did seedlings come up and occupy their place, the case would be quite different, but such is not the case. Only scrub succeeds cultivation; indeed the very cause—want of soil—that rendered these cleared tracts unfit for cultivation also renders them unfit for again supporting forest trees. There is something melancholy in the appearance that these headless, branchless trunks present to the stranger. What had lately been fine symmetrical trees of Abies morinda, 100 to 150 feet high, and as straight as an arrow, are seen standing without a branch, partly denuded of bark, and as dry as tinder, there to remain until the roots become so rotten that they will no longer support the trunk, and then these princes of the forest, that have withstood so many blasts, fall, and lie until they crumble to dust.

From many of these localities now alluded to, the timber could not be floated; from others, it perhaps might, although only with great difficulty, as the streams are very rapid, and their courses crooked and rocky; and until timber sells at a much higher price than it now does, it would not pay to transport it by coolies. However, prices seem to be still rising, and good timber year by year becoming scarcer. Some enterprising Yankee may yet make a fortune by shipping pine from Vancouver Island or British Columbia for the use of the public works department in India. These magnificent trees, if possessed of no value beyond that of the timber they contain, it matters but little whether they are growing or rotting so far as regards that, but if they have other purposes to subserve in the economy of things, they cannot be too carefully preserved. They seem to have other purposes to serve, and in doing so contribute indirectly to man's comfort and happiness in perhaps a greater degree than if he could have used them directly. As to whether or not they in any way affect the rainfall of a district, there is some difference of opinion, but none regarding the influence the vegetation exercises over the regularity and abundance of the flow of the springs in a district. The upper waters of both the Ganges and Jumna are taken up every drop during the hot season for irrigation purposes, and with all, still far too little for the wants of the districts through which the canals pass. Until the minimum supply be increased, general irrigation cannot be extended. That system of wholesale destruction of forests now in operation, only for the purpose of keeping alive a wretched system of cultivation—of which laziness is the parent, and, if report be true, misrule the supporter—is fast making the districts in which it is practised treeless wastes, or, at best, only partially covered with useless scrub, such as Prinipia, Berberis, Indigofera, &c., and it will tend to diminish not to increase the water supply for hot-weather irrigation.

I may remark for the benefit of those who are not well up in their Indian geography, that these forest tracts now spoken of lie in western Ghurwal, which is under the benign rule of the Teera Rajah; but whether they are under the supervision of the Government forest officers or not, I cannot say. I have heard that some of them are. Near Byratt, where there seems to be a considerable deal of timber felled, and under the supervision of qualified forest officers, felling seems to be done promiscuously. The young trees are taken as well as the old—at least I infer so, from the fact that no young trees worth speaking of are to be seen on tracts that had lately been cleared of old timber. There may have been none to leave in that district; still, as a rule, where there are old trees, there are also young ones. Perhaps the idea may have occurred that it was better to make a clean sweep at once, and thus save the cultivators the trouble of clearing.

Hunting, Fishing, and Shooting.

EXCURSIONS IN THE SOUTH OF CHINA.

BY LIEUT. OLIVER, ROYAL ARTILLERY.

A VISIT TO SHAO-K'ING-FU AND THE MARBLE ROCKS.

ON December the 5th, 1860, Baron Gros, the French plenipotentiary, arrived at Canton from the North, with the copy of the treaty of Tientsin in his portmanteau, and the next morning peace was proclaimed to the city in all due form. How glad the European garrison on the heights were to learn the news need not be said, for they had been long cooped up within a small compass, with few amusements, and sickness rife in the cantonments; so that it was a great relief to every one to hear that now all restriction to excursions into the country was removed; and shortly after a small party, of which I formed one, determined to pay a long contemplated visit to Shao-K'ing-(Fu), the antient capital of the two Kwangs, distant from Canton about 80 miles up the Si-Kiang or West River.

As this was to be an expedition by water, the first thing was to hire a boat in which we could travel comfortably, and we soon arranged for the hire of a faitan or fast boat, for an eight days' journey to Shao-K'ing-(Fu) and back. A[illegible]e and communication are chiefly [illegible] throughout China by means [illegible] of travelling boats are built [illegible] The one hired on this occa[illegible] [illegible] Dragon (an appropriate name [illegible] we went), which was in[illegible] barge, 70 feet in length, and with great beam in proportion, with one mast stepped well forward, and the customary high stern, with its accompanying huge sweep used for both sculling and steering. All our preparations having been completed we were towed across the river, here called Starling Reach, to the Fatee creek, one of those numerous tidal streams that permeate the vast delta of Kwangtung (Canton), through which the local mariners know various short cuts, and our faitan slowly threaded its way through the narrow water-way barely left open between the innumerable crafts, junks, faitans, sampans, and rafts, which frequent the populous suburbs on either bank. It was about noon, under a blazing sun, that we passed Houequa's garden on Gough Island, one of the noted show places about Canton. All about here is a waterside population, mostly occupied in junk building and boat making, and very good boats they can build too—if they only have a copy they can equal it in every respect.*

Passing the suburbs, the houses gradually became less numerous, and soon paddy fields lychee trees (Euphorbia litchi) intervened. A good towing path led along the entire route on each side, and our crew, who had hitherto been poling the faitan along, now stripped naked, passed broad belts across their shoulders, attached to a towing rope of twisted rattan, which was made fast to our mast, and, jumping ashore, they pulled us along at a considerable pace. The whole of the country is here quite flat, and at this time of the year, before the rice is planted, quite dry. Here and there were a few bushes at the water's edge, and a clump of bamboos. The

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* We had a capital four-oared "funny" built for us by one of these builders on an English model, equal to one of Searle's best.

natives were mostly employed in
ng up the ground, using the uncouth
uffalo (Bubalus buffelus) for draught.
nd there a sampan appeared, with
pants fishing or collecting the spawn
in the Fatshan market. It was a hot
ring afternoon, and after the bustle
ise of the western suburbs, the quiet
enery presented a pleasant contrast.
listance were two or three little white
peeping from their overshadowing
, nearly all of them marked by small
or towers. On turning a sudden
o the south, we saw a collection of
at anchor between two villages,
-How and Yun-kin-Chung. The
of numerous flaunting banners, and
w of gaily-painted wicker shields and
es or spears, together with the clang-
e brazen gongs and the rattle of tom-
ave sufficient notice to us that this
leet of braves on their way west to
the Tæpings, who were devastating the
above Shao-K'ing. On account of
sence of these noisy swashbucklers,
w would not land as they had in-
but, afraid of "squeeze pigeon," if
downright robbery, from the military
ins, made all haste to pass by such
ulous neighbours. The Mongol
appeared to be closely packed on
e junks, but if one judged rightly, the
of flags displayed was greatly in excess
umber of combatant warriors. There
enty vessels in the fleet, each holding
xty to seventy braves— in all, they
bout twelve hundred men of all
besides officers. They crowded the
f their junks to see the foreign white-
evils pass them, and saluted us with
jests and remarks upon our personal
nce, the reverse of complimentary.
setting sun was nearing the horizon,
nt breeze sprang up, and it was most
t to sit on the deck watching the
nks and looking out for fresh novel.
each bend of the river was turned,
our sail being hoisted, we glided on-
with easy and almost imperceptible
. Some conspicuous red mandarin poles soon denoted the neighbourhood of a populous town, and we then passed Upper and Lower Kup-Kow, an aristocratic locality, at some distance from the south river bank, whilst in front of us lay the great manufacturing commercial entrepôt, the city of Fatshan. Although the breeze was favourable, we did not reach the canal which traverses this busy town until after sunset. Business hours were over, and most of the upper and middle-class citizens were sitting enjoying the evening air with their wives and children in open summer houses and verandahs overlooking the water. As long as it was light, the quays, windows, and terraces were crowded with eager spectators, who quickly assembled to see the unusual sight of European travellers passing through their town.

It soon grew dark, lights began to illumine the windows, glazed with their oyster-shells, and quaint lanterns were shewn at the various hongs. The clang of gongs and drums was heard from a neighbouring joss-house, and from the flower-boats resounded the high notes of the singing girls, accompanied by lutes, clarionets, and other stringed and reed instruments; the universally popular "Jasmine flower" melody being often distinguishable. At seven P.M. we came to anchor in mid-stream, just beyond the city, the boatmen not being at all sure of what treatment we might receive at the hands of the patriotic citizens of Fatshan. Next morning we were on the move at 3 A.M., and we landed with our guns about six o'clock at a place called Tsz-Tŏng. Here was a fine broad-towing path, on an elevated solid bund or dyke, running alongside the river as a defence against inundations. The course of the stream is very tortuous, and the country still flat and dry, with large patches of sugar cane, dry paddy fields, and acres for miles together of mulberry bushes and cotton. A considerable quantity of silk is produced in this neighbourhood and further south. Several miles to the north of us were sandstone hills of no great height, evidently friable, as they were much scarped by water action. We were not idle with our guns, and bagged some common snipe (Gallinago stenura) and quail (Coturnix communis), with pigeons; by the water were plenty of egrets (Ardea egrettoides), divers (Podiceps minor), and various kingfishers (Halcyon fuscus, H. pileata, and Ceryle rudis). All this time our boat was rapidly going ahead of us, aided by light breezes, and we had to put on the steam in order to come up with her, especially as our morning walk suggested breakfast. We passed through the village of Kee-Shek, and saw nearly opposite another called Shay-ung-Kow, and a large island covered with wheat fields. We did not catch the boat until it came into the shore at Seong-Tung, where we halted and bought fish and eggs for a ridiculously small amount of cash (small copper coin with a square hole in centre). Food, indeed, is remarkably abundant throughout this part of China; our usual fare was chicken, curry, and rice, with fish. The rising tide warned us not to delay, and taking advantage of it we let the boat proceed, following ourselves on foot this time on the southern bank. The soil here is of a red and yellow tenacious clay, and numerous brick-kilns were conspicuous. Mulberry bushes still abounded; across the river we could see a remarkable peak called the Lion's Head. Before noon we passed close to a village called Ma-shâ embosomed in bamboo, litchi, and banyan trees, with fields of mustard and sugar-cane. The villagers here turned out and seemed disposed to give us some trouble, but they did not proceed to take any active hostile measures beyond making use of menacing gestures and insulting cries, which fell harmless on our barbarian ears. On our way we visited some primitive sugar-mills, the roller being worked round a pivot in a wooden shallow saucer by the ubiquitous buffalo; the juice when cooked is turned out in flat cakes, with an appearance not unlike cakes of toffy. When the sun was at its highest we retreated from its glare into the shelter of our faitan, and were nearly all dozing when our approach to the large commercial town of Sy-nam was announced, and we went on deck to see this important mart, famed for its iron-ware and other manufactured goods. Its population is estimated at 20,000 inhabitants. On the west of the town, on some friable sandstone cliffs, undermined and caverned by the river, were some strong batteries with brass guns in the embrasures commanding the river approach to the town. These same crumbling sand cliffs were extensively honeycombed by numerous crowded burrows of sand-martins (Cotyle riparinsis and C. sinea), which seem

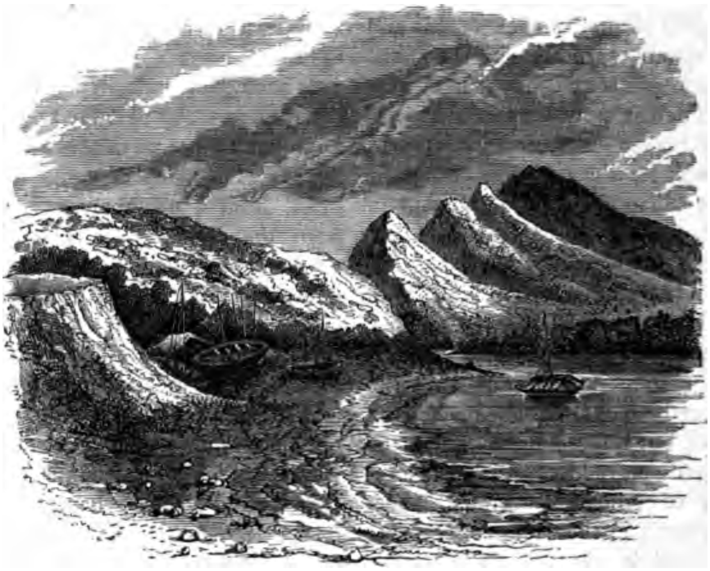

Fig. 1.—Entrance to River, &c.

to breed here. The river was covered with small ferry boats and sampans, whilst numerous trading junks were loading at the wharves for the North river trade, and large rafts were floating down stream from the upper districts about Wu-chu-fu, where timber is plentiful. On some of these large timber rafts are whole villages of the lumber-men, and the rafts are so constructed as to be divisible, in order to pass narrow creeks or sharp bends in their passage.

We could see in front of us, about three miles distant, the tall white pagoda of San-shui, and within an hour and a-half after leaving Sy-nam we reached the landing-place for San-shui, the town itself lying inland about two miles. San means three and shui water, the name being caused by the junction of the North and West rivers, forming the Canton River, taking place here. Our distance from Canton was now forty-five miles. The town is walled, and is the chief town of the district.

On Wednesday the 13th March, by 7 A.M., we were passing Tsing-Kee, with its large square tower, denoting a government pawn-broking establishment. As soon as we had cleared this place, we had our usual matutinal swim, and then a walk along the paddy-fields. Far a-head were now to be seen distant ranges of hills and mountains, whilst the country about us grew more undulating, shewing that we had reached the antient coast-line, having left the rich alluvial districts which mark the Cantonese delta.

The Country Gentlewoman.

POULTRY—SALT FOR PIGS—ITALIAN PLANTS—MISS MARCH'S BASKETS FOR DRAWING-ROOM DECORATION—EVERLASTING FLOWERS.

MY DEAREST SUSAN,—At last I resume my pen, and hope to have much to tell you which will prove of interest regarding the places I have visited, and the things I have seen, in my wanderings. I have been to two large poultry shows, and the vanity was quite taken out of me. I never saw such geese in my life; one gentleman exhibited a pen of three, weighing exactly 70 lb.; and the Aylesbury ducks were as large as our wild geese. By the way, do you give your poultry acorns? There has been a little discussion in one of the London papers, *Land and Water*, as to whether hens, ducks, &c., fed on the fruit of the oak, do not lay eggs with black yolks. To a certainty, poultry last autumn were guilty of strange freaks in this respect, and acorns do contain a very considerable portion of colouring matter; and pigs which have been feeding on them should never be killed until they have left off their acorn diet for some time, as acorns really do render the flesh of animals hard and dark. I have seen both acorn-fed pork and bacon, and neither were good.

Have you been in the habit of giving your pigs salt?—I mean the live animals. A great many feeders now advocate its use. We give our [illegible] just a sprinkling [illegible] makes a great improvement [illegible] also benefit [illegible] those [illegible] most carefully [illegible], and there [illegible] heard of the salt question. She gave her orders in a vague way, and poor old John thought if salt was that ere goodfor 'um, they should have their bellyful," as he expressed it, with more force than eloquence; so he gave them in their wash the contents of the salting-tub, strong brine, ignorant of the fact that if salt in moderation be alterative, saltpetre, in small quantities even, is a *poison;* so next morning there was a great outcry. The first words Mrs S—— heard as she was dressing were:—"Oh! cook, cook! our two pigs is as dead as herrings, and it is that darned salt as is done it all."

The pigs had departed this life—died an unnatural death for pigs, decidedly; and it was not the salt, but the saltpetre, "as did it.' A small teaspoonful of salt sprinkled over the food of a morning occasionally is about the right *quantum*. It destroys worms, and these internal parasites are a serious evil in pigs.

Moveable hen-houses are, I hear, quite coming into fashion. The plan was first recommended in *The Farmer*, I believe, about four years ago. These moveable houses answer famously. French feeders have used them for some time. M. Giot was the inventor of them. I strongly advise you to invest in one, and begin to use it this spring, and give your poultry some corn, otherwise the "diet of worms" will disagree with them.

How does your garden progress? I made a charming collection of wild flowers in Italy, and I am now drying sea-weeds. Some portions of the Campagna are rich in floral treasures. At first one can scarcely realize this, for we are apt—at least I know I was—to associate with one's ideas of the Campagna a sort of desert, a miserable waste, a place where death lurks, as so it does at some seasons of the year. The dreadful miasma is fatal to human life. The night air carries certain fever with it; but still the Campagna itself, in the vicinity of Rome, is very lovely

It is well cultivated, and the peasants from the mountains come down to reap the golden corn in the months of June and July, bringing their wives and little ones with them. They dwell in tents, like wandering Arabs, for the time being, and the priests go out in a moveable wooden chapel, very like a hen-house, to perform mass. I do not know a more picturesque scene than mass in the Campagna on a brilliant sunshiny Sunday. Mass at St Peter's may be a grander sight, but not nearly so interesting to me. I do not think that, when at Rome, I was at all disposed to follow the old maxim of "do as they do at Rome;" or, as a poor old lady once said in my hearing—"My dear child, when in Turkey we must do as the turkeys do." I only went, not "to scoff," but to see, and as the prayers are all in Latin I had no chance of "remaining to pray."

There is a beauty about the Roman wild flowers, which far excels our own. The bright sunshine decks them with warmer tints; there are numberless scillas and fragrant orchids, the lovely Appenine anemone, and the deep crimson cyclamen. The trees, too, are very striking; there is something exceedingly graceful in the tall, slender, Italian poplar, the dark sombre cypress, and the singular tufted tops of the stone pines. But I must not weary you with descriptions of Italian scenery.

You ask me about Miss March's baskets. I know what you allude to. They are exceedingly elegant. They are made of glass, handles and all, made expressly after a design by Mr March. The Misses March have gained several prizes for decoration, and the arrangement of the drawing-room and the dinner-table. The baskets for the drawing-room are sold in sets of three; they are exquisitely simple, very inexpensive, and when arranged by skilful fingers, add much to the beauty of a room.

I saw some decorated exactly in the same manner as the first the Misses March arranged for the Royal Horticultural Exhibition, when they gained Lady Dorothy Nevill's prize of six guineas.

The centre basket contained lilies of the valley, white lilac, and narcissus, the foliage being composed of fern fronds and lycopodiums. One of the smaller baskets contained purple gloxinias, and the other roses de Maux. The very simplicity of the entire arrangement was its chief charm.

What a singularly favourable season for flowers this has been. Some of my pets have blossomed everlastingly, I hear, in the old sheltered garden. *Apropos* of everlastings, what beautiful ones are brought over from the Cape. I advise you to grow a few of them; you can have no idea how bright they looked mixed with different grasses on Mrs G.'s drawing-room table a week ago. She told me she struck the cuttings last June, and when they were rooted, potted them off singly, using some sandy peat (fibry peat); then set the pots in a cold frame, keeping them close, and well shaded from the sun until their growth progresses freely. She cut the points off the shoots so as to give the plants a dwarf habit, exposed them to the air by degrees, and then in October removed them to the greenhouse. You know it takes three years' culture to insure good bloom, so there is some trouble; but once a plant is well established, it will last in perfection for several years without shifting. A good top-dressing is all that is required.—*Helen E. Watney, Sussex.*

ON HOUSEHOLD SERVANTS AND THEIR DUTIES.

BY THE LATE MRS PARKES.

EXTENT OF ESTABLISHMENTS OF SERVANTS.

ESTABLISHMENTS of servants, considered according to their extent, may be classed under the following rates :—

An establishment of the first rate, such as may be supposed to form the household of a nobleman of high rank, number from twenty to twenty-four domestics :—

WOMEN.

Housekeeper.
A lady's maid for each grown up lady of the family.
Cook.
Upper housemaid.
Laundry maid.
Under housemaid.
Under laundry maid.
Still-room maid.
Kitchen maid.
Scullion.

MEN.

House-steward.
Groom of the chamber.
Valet to each gentleman in the family.
Man cook.
Butler.
Gentleman's footman.
Lady's footman.
Under butler.
Gentleman's coachman.
Lady's coachman.
Couriers—outriders.
Grooms, in number according to the stud.
Under servants—errand boys—steward's boy.

To this establishment, that of the nursery (see "Nursery") may be added when requisite.

In an establishment of such magnitude, the duties of its members are perfectly distinct. Order and subordination must necessarily be maintained in it, by the proper administration of the household laws, and by the observance of "household etiquette ;" or anarchy and confusion, instead of convenience and comfort, would be found within this miniature world.

An establishment of the second rate, suited to incomes of £5000 or £4500 per annum

[illegible]

Housekeeper.
Lady's maid.
[illegible]
[illegible]
Laundry [illegible]
Under h[illegible]
Under laundr[illegible]
Kitchen mai[illegible]
Scull[illegible]
[illegible]
[illegible]
Two [illegible]
Und[illegible]
T[illegible]
[illegible]om.

[illegible] establishmen[illegible] [illegible] [illegible]forms th[illegible] [illegible] house-steward [illegible] hose of his own

An establishment of the third rate, suited to incomes of £4000 or £3500 per annum :—

WOMEN.

Housekeeper.
Lady's maid.
Cook.
Upper housemaid.
Laundry maid.
Under housemaid.
Kitchen maid.

In this establishment of women-servants the under housemaid is expected to assist the cook in serving dinner, and the laundress on ironing and mangling days.

MEN.

Butler.
Footman.
Under butler.
Coachman.
Groom.

The butler here performs the duties of the valet, as well as those of the house-steward.

An establishment of the fourth rate, for incomes from £2000 to £1500 per annum :—

WOMEN.

Housekeeper.
Cook.
Housemaid.
Laundry maid.

In this establishment the housekeeper is expected to superintend the cooking, and to act, if required, as lady's maid also.

MEN.

Butler.
Footman.
Coachman.
Groom.

An establishment of the fifth rate, for an income of £1000 or £1200 per annum :—

Cook.
Housemaid.
Under housemaid. Expected to assist the cook when serving her dinner.
One man-servant.

An establishment of the sixth rate. Income from £700 to £600 per annum :—

Cook.
Housemaid.
Foot-boy.

An establishment of the seventh rate. Income, £500 to £450 per annum :—

Cook.
Housemaid.

An establishment of the eight rate. Income, £300 to £250 per annum :—

[illegible]-servant.
One girl.

An establishment of the ninth rate. Income, £200 to £150 per annum :—

A maid of all work.

Incomes still less will admit of a girl only, or with the occasional use of a charwoman.

DUTIES OF THE HOUSE-STEWARD.

The house-steward is the representative of his employer in all matters of business connected with the house; he hires, discharges, manages, and directs every subordinate member of the establishment of men-servants, with the exception of the valet, whose conduct and qualifications come more immediately under his master's notice, and more materially affect his comfort, than those of any other member of the household.

The steward purchases every article consumed in the house; and it is necessary for him to have very sufficient knowledge of the qualities of the articles to be bought, and the right season for laying them up. He should never deal with any but tradesmen of known probity, whose interest it is to recommend to him only the best of their commodities.

In accounts the steward must be ready, though domestic book-keeping, not being of a very complicated description, requires great accuracy rather than proficiency in the science of figures. It consists chiefly in keeping a strict account of moneys received and disbursed. The mode in which his accounts are to be kept is sometimes directed by his employer. If left to his own arrangement, his desire should be to render them simple, or he may give his principal unnecessary trouble at the periods of their examination. Neither should he trust to memory, but make instant memoranda of all payments and receipts; nor, if he regard his own interest, will he pay any sum away without demanding in return a proper receipt. By not doing that, he may subject his master to the liability of a second payment, and himself to the loss of his situation and character. All currents accounts are usually made up by the steward half-yearly; and, when examined by his employer and found to be correct, a receipt or acknowledgement of their accuracy is given him by his master.

In the room appropriated to his use the steward keeps his books and files of bills. In the room also he makes a point of remaining for certain periods each day, that all the other members of the household may find him ready to hear their questions or complaints. This done, he then proceeds to the different offices to see that in each the duties of the day are properly engaged in.

The house-steward, in some instances, has the general superintendence of the stables, seeing into the fair and honest use of hay and corn; but this duty is usually performed by the coachman.

Whatever superintendence or investigation is usually given, in smaller establishments, by the principal himself, the house-steward must consider himself as bound to do. These duties all inquired into, the steward then examines into the state of the larder and stores, and prepares for market. The purchases are given into the housekeeper's hand, who, after weighing and examining them, gives him in exchange vouchers, which are afterwards compared with the tradesmen's accounts.

DUTIES OF THE VALET.

The valet in small families is expected to assist as footman also; but his particular province is to attend exclusively to the personal accommodation of his master. Upon him he waits during all times of dressing and undressing; brushes, folds up his clothes, or places them in readiness for him. All repairs he sees done; and on putting away cloth clothes into a wardrobe, he uses the precaution of covering them with brown holland or linen wrappers, to secure them from dust.

Boots and shoes (cleaned by the under-footman) should be placed every morning ready in the dressing-room. The valet should see that the housemaid cleans the grate, lights the fire, and sweeps and dusts the room, while he prepares the washing-table by filling the ewer with soft water, and the carafe with fresh spring water, and by putting in their right places basins, towels, and brushes: hot water and the shaving apparatus should be at hand; the linen and slippers airing at the fire; and the rest of the apparel to be worn hung across the backs of chairs, and covered over with holland wrappers.

After the dressing is over, the valet shou take the earliest opportunity of cleaning and putting away the razors, and everything which has been used, in its proper place.

For wet weather, when his master may come in from riding, the valet should be always prepared, by having ready the necessary changes of linen and clothing, and by being himself in waiting, to remove the damp clothing, and to prevent its being injured in the drying.

Before putting damp woollen clothing to the fire, it should be rubbed with a sponge, the way of the nap, until the smoothness of the surface is restored. If dried without this precaution, brushing will not be effectual in removing the roughness.

In preparing for journeys, the valet should endeavour to ascertain the probable time of his master's absence, that he may be able to provide a sufficiency of linen and other clothing. At the inns he takes charge of these supplies, and, as at home, places everything in readiness for the periods of dressing and undressing. Besides this, if his master be unattended by his footman, it is his duty to attend to his accommodation generally, as well as in his dressing-room. Whenever his master needs his services, he must be at hand; even at table, if more than ordinary attendance be required, he must be ready to wait.

DUTIES OF THE BUTLER.

The butler ranks as second in a complete establishment.

The butler is chiefly responsible for the management of wine and ale cellars, and for the direction of the various repasts of the family.

[illegible] giving [illegible] butler to [illegible] at the [illegible] the wine and [illegible] probable he may [illegible] le. Thirdly, he [illegible] under butler, and steward [illegible] engaged in their proper departments. The immediate superintendence of the [illegible] servants falls on the butler, [illegible] responsible for the propriety, neatness, and cleanliness of everything at table, and which can only be effected by each department of duty being properly fulfilled. Fourthly, he dresses and stations himself so as to be at hand to open drawing-room and parlour doors to all visitors or members of the family passing to and fro. At luncheon he waits, unattended by a footman, unless, company being present, the size of the party requires more aid. At dinner and tea he also attends; and between these two repasts he answers bells and waits upon the company, while the footmen are engaged in clearing away, and cleansing whatever articles in their department have been used at dinner. At bed-time the butler brings up night candles; and, when the family and company are retired to their rooms, he locks up the plate, sees that windows and doors are secured, and fires left in no dangerous state.

In addition to these daily cares are those of the wine and ale cellar; the wine required each day he brings from the cellar himself, a short time before dinner; decants it, and keeps it under lock and key till wanted. The servants' allowances of ale he draws himself; and at some seasons he has to fine, bottle, cork, seal, and place in the binns wine purchased in the wood. He has to make regular entries in his cellar stock-book of the number of bottles used, of the age and character of wines in each binn. The brewing, racking, and bottling of ale and other malt liquors belong also to his department of duty.

The butler in establishments of second and third rate undertakes some of the duties of house-steward and valet, having, like the former, to market, pay bills, and to superintend all the other departments of the men-servants as to the daily performance of the duties of each; and, like the latter, to give also personal attendance, at stated seasons, at his master's dressing-room.

DUTIES OF THE MAN COOK.

The man cook is, in this country, found chiefly in the large establishments of princes and noblemen, or in those of very affluent families. He is also occasionlly the superintendent of the kitchens belonging to public institutions, to hotels, clubs, &c.

He makes out bills of fare, which are sometimes submitted to the principals for approbation. For this part of his duty it is requisite that he should be well acquainted with the high season of every dish (almost every dish having its season), and be able to perceive the exact state of everything he has to prepare. If he cannot make a good selection of the articles which are to be submitted to his skill, he will in vain exert that skill, and his employers will be disappointed in the result. No art can give excellence to an inferior article, or restore qualities which have been destroyed by natural changes in the substances themselves. The man cook, besides superintending the cooking generally, chiefly prepares the rich stews, ragouts, soups, and other dishes of a complicated description, not understood by ordinary cooks, whose greater variety of business precludes their attainment of the highest degree of proficiency in the art. Excellence in cooking can only be the result of practice and experience; united to which it must be acknowledged, that reflexion and judgment are indispensable qualities in the character of a cook. As in chemical experiments one successful results leads a reflective man to attempt others, so, in cooking, one approved recipe may be productive of many varieties. In no dinner party would there be uniformity of taste; and the skill of the cook must therefore be exercised in meeting this with such various flavours as may give to every guest an equal chance of gratification.

DUTIES OF THE FOOTMAN.

The footman's routine of business is, in a complete establishment, of a subordinate description.

In the morning he assists in rubbing mahogany furniture in the dining-rooms and libraries, cleans windows, and sets ready for use, in the butler's pantry, all the articles which may be required for the breakfast table, and which, after breakfast, he has again to clean and put by into their proper places. Afterwards he cleans himself, and prepares to attend the carriage, to answer bells, or to obey any orders given him by his master or mistress. If he has to follow the lady whom he serves, or any of the female part of the family, in their walks, he is not to consider himself as a mere appendage which marks the condition of the family he serves, but as a protector from the inconveniences and annoyances which may occur to ladies walking in a thronged and busy place. For this end he should follow his mistress at such a distance as to be immediately at hand if his aid or interposition be necessary, and yet not so near as to hear conversation which may be passing between her and her companions. At dinner he again attends, having previously assisted to prepare the table for it. Dinner ended, his next duty is to clean and put away the same things, while the butler attends to the bells of the dining and drawing-rooms. At tea he again waits; and, generally speaking, his daily avocations end after the tea things are brought from the drawing-room, washed, and put away, the butler usually seeing to every subsequent duty.

The footman in small establishents of servants, or in families in which only one manservant is kept, has more general and constant occupation than those who belong to "the complete establishment."

In the former case, not being under the control or dictation of a superior servant, the general arrangement and management of his employments devolve on himself; and, unless he has method, he will feel hurried and overdone, without being able to give his employers satisfaction. In describing the daily routine by which his occupations may be pursued with precision and method, it must be remembered that in each family there may be circumstances and customs to which the servants must conform, and adopt their business accordingly.

The mode in which a footman plans his work on entering a new service, with the determination he shews to adapt that plan to the circumstances around him, and, when once settled, to adhere to it with as little deviation as possible, displays ability and a most desirable habit of order.

The sole footman in a family has to perform some of the duties both of the superior and inferior members of the complete establishments; and if in a numerous family, or one which has frequent company, it will require his all dilligence and activity to keep everything straight and in good order.

He must rise early, and endeavour to get some of the roughest part of his work done before his breakfast, and before he is required to appear in the breakfast room. In order to preserve the cleanliness of his clothes, he should be provided with a complete overall suit, made of materials that will either brush clean or bear washing. Covered over with these, he brushes the clothes of the gentlemen of the family, then cleanses and polishes their boots and shoes, which the night before, if wet or damp, he had placed at a proper distance from the fire, to dry them gradually—an attention which enables him afterwards to give them a finer polish. These done and set ready to convey to their owners, he then cleans the knives and forks, wipes them, and puts them away till wanted. After this he washes and cleans himself previously to the preparations for the family breakfast table. After laying the cloth, and placing the required number of cups, saucers, plates, &c., he puts the heater into the kitchen fire, sees that water is boiling, and the supplies of bread, butter, &c., ready, and then is prepared for the summons for the urn. His own breakfast time is regulated by that of the family, the footman in some houses taking breakfast with the other servants, and in others in his own pantry, or he remains [illegible] the family breakfast [illegible]

After [illegible] footman [illegible] [illegible] close [illegible] whatever [illegible] breakfast [illegible] attention [illegible] coming o[illegible] [illegible] pantry till they are wanted. The mahogany furniture in the dining-room or library he must rub daily; and twice weekly he ought to wash away any spots it may have acquired, restoring afterwards the polish it may have lost. Some of the windows he should clean weekly, availing himself of periods in the day when the occupants of the rooms are absent from them. Afterwards returning to the pantry, he should set himself to prepare something or other for the dinner table; either to rub the plate, to wipe the glass, &c., until it be time to prepare for the luncheon. During this part of the day he should be in such a dress as is not inconsistent with his employments, nor yet unfit for him to appear in if summoned by bells to the parlour or the hall door. A coloured cotton or plain cloth jacket and white linen apron are usually worn by footmen while engaged as above described. The parlour luncheon being generally called for about one o'clock, he must have the tray set ready; when carried into the parlour, and properly arranged, he will usually be at liberty to get his own dinner, which is generally ready at this period of the day. When his mistress requires it, the footman should be ready to attend her, either with the carriage, or to follow her if she walks out. For this latter part of his morning's duty he should be neatly dressed; his clothes and hat should be well brushed; his shoes and stockings and gloves clean. A dirty-looking footman is a disgrace rather than a credit to a lady. In giving directions to the coachman he should be quick and accurate; nor is it altogether needless to remark, that, even in his announcing rap at the doors of the parties on whom his lady calls, there is a propriety to be observed as to its measure and degree: if too loud and long, it disturbs a whole neighbourhood; if too insignificant, it may be deficient in respect to his lady. In following her during her walks, he should preserve a steady decorum of manner, and be observant and ready in case any emergency should make his aid necessary to her

THE

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ADULTERATION OF SEEDS.

TWO Special Reports have been issued by the Sub-Committee of the Council of the Royal Horticultural Society,* bearing upon dulteration of seeds, which merit an undi- d attention. The revelations and expos- which are broadly stated on the face of eports, are something of a startling char- , exhibiting all sorts of trickery in the ipulating of seeds. As the first Report has been before the public for a length of time, the strictures which it conveys remaining swered, it becomes a public duty to shew n the most prominent manner, the mal- ices complained of, and insist on rectifi- n, so that the righteous principle of fair ng may be upheld.

e Committee particularly notify four rent systems by which the buyer is de- led—

Generally by seeds being kept too long, being sold after they have lost their ity.

By the addition of bad seed to good, mixing old and new.

By the addition of seed whose vitality een killed.

By manipulating and doctoring the seed, to make bad seed look like good, as yeing bad clover seed, sulphur-smoking grass seed, oil-dressing bad turnip , &c.

The Committee, to give force and character to their Report, very wisely determined to purchase packets of cauliflower, broccoli, carrot, and white and yellow turnip seeds, from eighteen wholesale houses in London, unknown to any of them, and by the assistance of the officers at the public garden at Chiswick, to submit 100 seeds of each packet to a simultaneous trial. Out of that trial the following result was produced:

Out of the 18 packages of 100 cauliflower seeds, the following numbers respectively came up, viz.:—86, 70, 66, 60, 56, 54, 54, 52, 51, 51, 50, 44, 44, 44, 43, 39, 36, 24.

Out of the 18 packages of 100 broccoli seeds, the following numbers respectively came up, viz.:—86, 83, 70, 68, 65, 62, 60, 59, 56, 55, 50, 46, 42, 42, 39, 35.

Out of the 18 packages of 100 carrot seeds, the following were the numbers which came up, viz.:—61, 56, 54, 48, 47, 45, 44, 43, 41, 38, 38, 37, 37, 35, 33, 30, 19, 14.

Out of the 18 packages of 100 white turnip seeds, the following numbers respectively came up, viz.:—98, 95, 93, 87, 87, 83, 82, 71, 70, 68, 68, 66, 65, 64, 62, 60, 58, 57,

Out of the 18 packages of 100 yellow turnip seeds, the following numbers respectively came up, viz.:—95, 84, 79, 79, 78, 77, 72, 72, 67, 66, 65, 64, 62, 58, 55, 55, 44, 28.

It should be added that the quality of different kinds of seeds, obtained from the same tradesman, was not always uniform—

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* hese Reports will be found at pages 565, vol. i., 25, vol. ii., of this Magazine.

all good or bad. The cauliflower would sometimes be inferior and the turnip superior, and so on; but, on the whole, a good position in one kind was generally accompanied by a good position in all.

The selling of old seeds, which have been kept so long in the dealer's hands as to have lost vitality, is an evil which the public have been in a measure prepared for, and which they can at once understand, however disadvantageous it may be to their interests. In truth, they at once proclaim—sometimes rightly, and sometimes wrongly—that they have had bad seed, setting it down to the feeble germinating power of long-kept seeds. But it ought to be placed upon record, and fairly estimated, that the majority of seeds which fall under the province of the general husbandman, are in no way deteriorated by a year or two's keeping. In the matter of turnip seeds, in particular, there seems to be a prevailing impression that, by proper preservation, the stock is capable of improvement. Many aver that turnip seeds of two or three years' keep will yield a heavier acreable produce than is practicable from fresh seeds—that, in fact, a too rapid reproduction will yield tops out of proportion to the roots; and *vice versa*, with properly conserved seeds. But, unless seeds of all kinds be kept over in a dry medium, they will in time lose their vitality; the embryo may get partially developed in its tiny shell, and die unseen, because improperly cared for. The seedsman and dealer, therefore, although accountable and responsible for the safe keeping of the various seeds they are vending, cannot be considered to act fraudulently in that respect. t can only be unprincipled tradesmen who ither keep or procure seeds of too great an [illegible] that are amenable to censure.

ut who will be bold enough to exonerate he parties who knowingly and systematically dd bad seed to good, and moreover kill hat may be presumed to be a bad strain, o intermix with good fresh seed to swell its ulk, and impose upon every customer with hom they deal. The gauntlet has really een thrown down to the whole seed trade he kingdom by this Committee, and although certain members of the busily promoting a measure in Par check adulteration in seeds, not member steps forth to endeavour to vindicate, or excuse, or palliate th of this Committee.

The practice of killing seed of cannot be too strongly denounce trade seem perfectly impotent, a apathetic, to endeavour to grappl The system has grown to so alarmi tent that, in order to cope with scrupulous members of the trade, s like mixing is an invariable order o Like every unchecked evil, it has gr small to gigantic dimensions, and once only practised by the needy man, begins at the seed farm, is ma by the wholesale dealers; and by that it reaches the nondescript re chances of vitality, and being tru racter, are only a small per-centage

The seed trade, in turnips, for in a gigantic concern in comparison to seeds named in the Report in quest how about it? It involves a qu magnitude in which farmers and agri generally would like to be partic formed upon, so that an issue ma clared with no uncertain sound. N going to market with the intentio chasing the best article at comma dreams that that very superlative more or less adulterated, and that t with whom they are dealing knowing it through hands. But let the C speak for themselves upon this point London wholesale seedsmen have es among themselves a trade club, som the nature of a trade's union. On chief functions of the association is, Committee are informed, the regul prices, and the determination, by consultation and advice, what kinds should have their average lowered, what extent it should be done." Thi can scarcely be looked upon in a light than a species of trickery; but strong denial has been given to this by individual members of the Associ

One of the principal apologies brought nder our notice in regard to turnip seed is, at the public really lose nothing by the uantity of killed seed introduced—that is, if do not exceed 25 per cent. ; that the best urnip-sower that has ever left the hands of ny agricultural engineer will fail to deposit he seed so thinly as to be in the highest degree economical; and that, consequently, the ourth per cent. of dead seed is more a nomial than a real loss. That is a sort of special leading, but it is not consistent with high ommercial rectitude. Soils vary in their apability for assisting germination and pronoting the growth of the embryo; then the ontinual war of insects, a fluctuating season f cold or drought, so unpropitious to the eedlings—all have a depressing and deteriorating tendency. It is clear, therefore, that good seed, as near 100 per cent. in power of vitality as possible, should be forthcoming on demand, at a fair remunerative price. The public are as much entitled to this, from the hands of either the wholesale or retail seedsman, as they are in demanding that the so-called 4 lb. loaf of wheaten bread shall weigh 4 lb., and not a single ounce less ; and it is just a question whether the same sort of legal remedy should not be set on foot to protect any flagrant exercise of this reprehensible system of mixing.

Buyer and seller meet in the market, and fter quotations are given, according to the ractice of modern times, the first question asked, Is it nett seed?" "No ; but I will guarantee 5 per cent. ;" and so far as between the wholesale and retail representatives there is a air understanding. The seller honestly avows he quality of the seeds offered, and the buyer ccepts the bargain at the price agreed upon mutually, and, as between these contracting parties, there is no direct dishonesty. That is purely a trade affair, however, and the hundreds of thousands who actually spend the money with the view of testing the reproductive power of the article, either for commercial purposes or for "own use," have known nothing of this paction. There may be a few that either have gained the confidence of the trade, and so are partly initiated into the mystery, or have come to hear of it incidentally; but the great buying public know little or nothing of this killing process.

The manipulating and doctoring of the seed complained of is also, we understand, assuming by no means unimportant dimensions. Clover seed is particularly treated to take the eye of the market ; and so nicely is the operation sometimes performed, that it takes the cleverest expert to detect the imposition. As is well-known, yellow clover seed is cheap enough, and easily come-at-able, and, consequently, is subjected to the doctoring process to induce the buying public to believe that it is something which it never was and never can be. It is a scandalous practice to dye yellow clover seed so as it might be vended for red clover seed. Farmers sow upon trust their samples of rye-grass and clover, and are rewarded with a return the opposite to what was intended, and their whole proceedings are consequently stultified, the acreage for which they are paying heavy rental all but monopolized with the least remunerative article. This case is even worse than the turnip or any of the cereal crops which grow and are cleared off during the season, for it is patent the first season, while under the nurseship of some of the cereals, and can neither be eradicated or replaced, to insure what was intended.

Seedsmen, on the other hand, not unjustly complain that customers will wrangle and quibble over paying an extra penny a pound for clover seed, and thus almost compelling a certain degree of adulteration, for the sake of not only maintaining a decent livelihood, but of keeping their customers together. There are so many applicants for public favour and support in the seed trade, that some sort of specious disguise is necessary to do anything like a thriving trade. There are, now-a-days, really so many clap-trap advertisements flaming in all the streets of our great cities, having a tendency to gull the public, that gullibility, if we may so express ourselves, is fast becoming a recognised order of the day. It is impossible to reach the unprincipled and needy adventurers of any business with any argument inculcating honest and fair dealing; but there are not a few hundred—indeed they may be reckoned from one to two thousand—seedsmen in our land committed to high principles of integrity, and from these men we expect better things.

Let it once be generally understood that there are a variety of classes of goods, some at one figure, and some at another; but, by all means, let the real article be purchasable, and then the transaction is fair, as honest as it is honourable. Let the nett seed be sold without alloy. That *trio* or dead seed sounds very harshly in the ears of buyers, who consider that they had procured the best article possible, by paying the highest quotations named in the seed catalogues.

As to the trials instituted, and the different per-centages that came up, we have yet a word to say. The dissimilarity in the goods of the eighteen different classes is very suggestive, and it must be recollected, too, that the sample parcels came, not from the retail, but from the wholesale trade of London. It might, probably, be invidious to mention names of houses, at the outset of an investigation, furnishing the samples which yielded the highest per-centages; but if the practice is to be continued of lowering the stocks in power of vitality, the sooner the better.

The public have no cause to pay good money away for a bad article; and if one house furnished yellow turnip seed that only realized 28 per cent., and another house furnished the same article, realizing 95 per cent., it is clear which house ought to be supported. Indeed, notwithstanding the trade unionism, and the mixing killed or bad seed with good stock, there are evidently a few houses yet that contrive, as the Report says, almost "single-handed" to rid themselves of the burden which the trade is anxious to impose upon them. They are evidently handicapped in the meantime, but let them be exhorted to pursue the straightforward honest course. Their cause is in good hands; and now that the matter is taken up, it will not, and cannot rest, until a revolution takes place. If the trade, as a body, will not alter their projects, going on to sell, and sell as heretofore, the simplest and best mode of bringing them to their senses is, for the same Sub-Committee to organize another testing process, procuring the seeds after the same fashion as formerly, and publish the names of the houses opposite the vegetating power of the seeds. This will be a more effective mode than a Government inquiry, and the expense attending it is no great matter to such a body as the Royal Horticultural. Were the sister society, the Royal Agricultural, to join them in this investigation, unprincipled seedsmen would have cause to be more careful, well knowing that at any time their goods were open to the scrutiny of a corporate body, who knows no favouritism, but who would endeavour to mete out justice to all, in impartial scales.

Portraits of Domesticated Cattle.

FOREIGN BREEDS OF CATTLE.

NO. I.—THE SCHWEITZ.

E propose from time to time to give illustrations of foreign breeds of with descriptions of their peculiarities. latter we are mainly indebted to the ate work of Mons. T. H. Magne, the continental authority on cattle and feeding; but we shall avail ourselves, when occasion serves, of other sources of information.

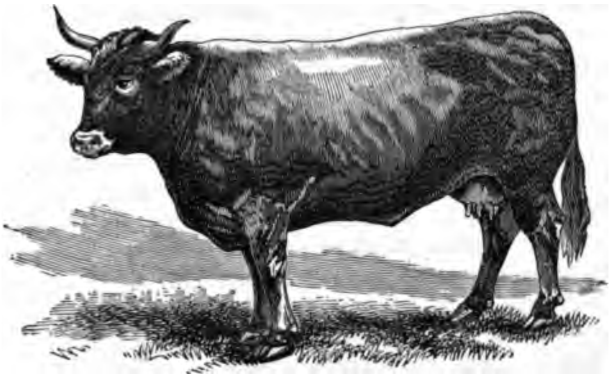

Fig. 1.—A Schweitz Cow.

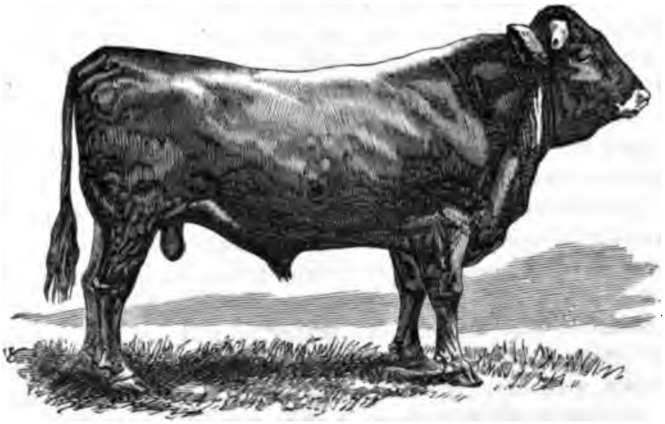

Fig. 2.—A Schweitz Bull.

The first breed we illustrate is that known as the "Schweitz," of a cow of which breed we give an illustration in fig. 1, and of the bull in fig. 2. The breed is met with chiefly in central Switzerland, and it is in the Canton reitz that the best types are to be had. nly within the last thirty years that been largely introduced into France. lour of hair is brown, with a yellowish on the dorsal spine, on its face, and its nd round its muzzle. Long hairs of ne colour cover the inside of the ear. small height, has a long body, a thick ead, a large muzzle, quick eye, large strong black loins, muscular neck and shoulders, large breast, round sides most ample, the shoulders are fleshy, the spine horizontal, the extremities well proportioned and strong.

The breed is very quiet and docile; it is celebrated for its milking qualities; the milk, however, is richer in cheese-making than in butter-making properties. Crossed with the shorthorn, the results are eminently satisfactory.

The Farm.

GATION, AND THE MANAGEMENT OF IRRIGATED LANDS.

MARKABLE as are the results obtained from systems of "Irrigation," judiciously planned and carefully exe- it is singular that we are somewhat in nce of the principles upon which these depend. One of the most obvious is, perhaps, the mode in which water a means of keeping up the tempera- f the soil, or rather, more correctly to by preventing the temperature from lowered during extremely cold water, acting as a shield or protecting cover- r by imparting an actual warmth to it, h the temperature of the water itself higher than that of the air. This latter frequently comes into play in irrigation, uch, as a rule, the water employed being ed from rivers or from springs, is gene- f a higher temperature than that of the al air. We could cite numerous facts in of the value of irrigating waters when igher temperature than the external air; content ourselves by simply drawing ion to it. But water acts beneficially igated lands not only in this way, by ng forward vegetation at an earlier than, under other circumstances, it ise would be brought forward; it acts a cause of increasing fertility in con- ce of its possessing in itself manurial ties. Although it should be noticed that may not possess both qualities, it may be warmer than the surrounding air; ay be both this and be possessed of posi- rtilizing value. It is, then, of import o be able to judge whether a water is likely to act as a direct fertilizer in cases there is no obvious admixture with it stances known to be fertilizing, as in the f town sewage, or of rivers which carry r waters deposits of manurial value. Soft waters, for example, are more valuable for irrigation than hard, although hard water may contain ingredients which may raise their manurial value considerably. Water from rivers and brooks in which good trout are found, and those on the banks or shallows of which water-cresses grow, are also good for irrigation. We have stated above, that a river water may be turbid, in consequence of having in its waters some deposited matter of a manurial value. It, however, appears to be a rule that clear water acts more beneficially than turbid. It is to be noted that we are here writing about water under ordinary circumstances—not of water turbid with town sewage. Another point worthy of notice, as regards the way in which irrigated land is benefited by water, is the peculiar action induced by the water filtering through the soil. Space does not permit us here to do more than merely allude to this as a cause of increasing the production of land; but all we know of it goes to shew that it is, upon the whole, a powerful one. We pass at once from the subject, therefore, to other points before us, and only note that from the action of filtering water on the soil is deduced the necessity to provide most carefully for the under-drainage of the irrigated.

While water warmer than the surrounding air, and water possessing in itself manurial properties, will always be valuable for irrigating purposes, it should not be forgotten that there are other qualities possessed of a positively prejudicial influence when applied to land. In some cases, analysis alone will yield the necessary information as to the quality of the water; in others, it may be known at once that they are bad. Thus, boggy water will act prejudicially; if lime is present, it will on some soils act prejudicially;

in others, favourably. The presence of iron and magnesia, however, may be decided as prejudicial to a water for irrigating purposes. It should, likewise, be borne in mind that wherever we have water, even of a poor quality, it may be enriched by adding manure to it in various ways which will here suggest itself, or by utililizing the liquid sewage of the farm, or of that obtained from farms and villages where that is available. We now proceed, after this brief introduction to the consideration of the practical points connected with the formation of irrigated land.

And here we cannot refrain from observing how singular it is that, while the benefits of irrigation are undisputed and indisputable, these benefits are so seldom availed of in this country. It is to the Continent that we must look if we wish to witness what can be done. To those, indeed, as we have in another place remarked, who desire to see the effects of a successfully carried out system of irrigation, a visit to the singular district of the Campines of Belgium, or the fertile fields of Italy, will be productive of much that will be at once interesting and useful. Perhaps the most striking exemplification of the benefits of the system will best be obtained in the Campines, for within a short distance of a district which has so benefited by it, the traveller will be able to examine one in which are the dreariest of sterile spots, these presenting a remarkable contrast to the others, and shewing how rapidly and completely sterility can be changed to fertility by such a comparatively simple process. The irrigation is carried out in a thoroughly scientific manner, government laws regulate its policy [illegible] scientific attainments originate [illegible] its practice. By the establishment [illegible] at once the feeder [illegible] highway [illegible] products of [illegible] whole fa[illegible] of which [illegible] becoming [illegible] changed, and districts are now highly productive which a few years ago bore upon their surface heath and briers, or were dotted here and there with the stagnant pools over the surfaces of which waved the water rush. A Campanoise farmer put the train or sequence of a cause and effect thus: "With the water the grass, with the grass the cattle, with the cattle the manure, with the manure all that we can desire." With the enormous demand in this country for live stock, it would be the best interest of the landowner to lay out in districts, where the nature of the land and locality would enable irrigated meadows to be laid with comparative economy. In many districts water is very easily available for irrigating purposes as it descends from high to low levels; or where brooks, streams, or rivers skirt low-lying land. Thus irrigated, land is capable of raising crops of grass which, in comparison with those grown under ordinary circumstances of pasture or meadow, can only be designated as enormous—30 to 40 tons per acre per annum, and affording repeated cuttings. Irrigated meadows permit of a large extension of the number of cattle kept upon a farm. Mr Pusey thus graphically sketches their advantages—"A slight film of water trickling over the surface—for it must not stagnate—rouses the sleeping grass, tinges it with living green, amidst snows and frosts, and brings forth a luxuriant crop in early spring, just when it is most wanted; whilst the other meadows are still bare and brown. It is a cheerful sight to see the wild birds treading these green spots among the hoar-frost at Christmas, or the lambs with their mothers folded on them in March. A water-meadow is the triumph of agricultural art, changing, as it does, the very seasons."

The different modes of placing land under irrigation may be classed under four heads—First, the catch meadows; second, the ridge and furrow, or float meadows; third, the "[illegible]ford" meadows; and, fourth, the system carried out by the aid of specially-[illegible] pipes, supplied either by the power of steam or by gravitation.

Of these four methods, the catch or catch-water system of meadows is the simplest, and is applicable where the land lies on the side of a hill, or where pretty steep declivities are met with. The system is named its principal feature, which is the ing of a series of horizontal, or nearly zontal, catch drains or carriers running g the face of the declivity at certain points, which arrest the water as it flows down slope, the distance between the carriers ying from 20 to 40 feet. The highest in, or carrier, is technically called the in carriage, and which collects the water n springs, &c., above it, and is carried in a rly level direction along the face of the . The length of this varies according to cirnstances, but if it is considerable, the line direction is changed, so as to bring it a few hes—a foot or thereabouts—below the ginal line. This is done in order to insure distribution or leading of the water along whole length, and to prevent the soaking ay of the water through the sods and ttom of the drain, which might take place t was too long. But in order to insure the ular and equal distribution of the water, it ecessary to cut, as above described, drains carriers parallel to the main carriers, and distances therefrom varying from 20 to 30 t. The land between the main carrier the first of these parallel drains sub-carriers is subjected to the flow the water from the main carrier, caught by the first parallel drain or sub-rier, shed over the surface of the land between it and the second parallel drain or sub-carrier and so on till it is finally delivered to the main drain at the bottom or lowest part of the meadow or hill side. The water from this main drain may either flow away to its natural outlet, or be utilized to irrigate another meadow lower down, or part of the same meadow at a little lower level. In order to enable any of the intermediate beds or irrigated surfaces between one sub-carrier and the other, and between the main drain, to be left dry as desired, various drains are cut in the direction at right angles to them, these being placed on the face of the slope at distances of from 9 to 10 poles. These cross drains connect the main carrier and the whole of the sub-carriers with the main drain at the lowest part of the meadow. When the land, or any portion of it, is to be irrigated, the ends of the sub-carriers immediately contiguous to the cross drains are stopped up with a piece of turf; the water thus prevented from flowing along the sub-carrier passes over its side, and is shed over the surface of the land between it and the sub-carrier immediately below it, which then takes it up. By adjusting the stops, the amount of water shed over any given surface of land can be regulated to any degree of nicety thought desirable by the manager.

ON THE IMPROVEMENT OF PERMANENT PASTURES.

BEFORE proceeding to the immediate object of our paper, it will be well y briefly to glance at the reasons which igh with us in recommending that in the rying out of any scheme for increasing home supply of animal food, that that thod should not be adopted which dends upon the breaking up of pasture d, so as to increase the breadth of tillage d.

The objections to breaking up the permanent pastures of the kingdom are—*First*, that the low-lying, flat, grazing meadows, which comprise the very best land in the kingdom, and which, under proper management, are more valuable, either in an individual or a national point of view, for the purpose to which they are applied—viz., the summer feeding of cattle—than for any other; and the only mode by which they can well be made more productive than they naturally are, would be by the consumption of farinaceous food by the stock grazing upon them. The adoption of such management would answer a doubly beneficial purpose—viz., that of more rapid and more perfect fattening of the stock, and, at the same time, by an increased manuring power in the dung of the animals, producing increased fertility of the pasture, and a consequent capability to maintain a progressively increased quantity of stock.

Secondly, to the conversion of pastures, of the description now referred to, to tillage, the same objection as urged against the conversion of tillage land to permanent pasture obtains, and for the same reasons—viz., that of the difficulty, when it might be desired, of again obtaining an equally permanent and nutritive quality of pasture; and an indiscriminate and extensive breaking up of existing pastures would certainly be an ultimate loss to the nation.

It is to be hoped that the obvious and cogent reasons advanced are so sufficiently well and generally understood and appreciated as to deter proprietors from acting so unwisely, for their own interests and for the public weal, as to convert pastures—especially those of the description spoken of—to tillage. In coming now to the subject of our paper, the improvement of permanent pastures, we shall first treat of those pastures which are on *alluvial soils*. As a rule, with but few exceptions, it would be of more advantage to the owner, and of greater benefit to the nation, to improve the pastures of Britain than to convert them into permanent tillage; and, as indicated by the heading above, the subject in the [illegible] immediately to follow will be the [illegible] improving permanent pastures. Of [illegible] description is the grass land on which [illegible] largest [illegible] occurred is the [illegible] grass [illegible] deep alluvial soils liable to injury from being overflowed by streams, rivers, and other natural watercourses. The herbage on the land in question is seldom of much, and frequently of scarcely any, value for the feeding of stock in its unimproved condition, on account of its rank coarseness and want of nutritive property. Such land, after having been thoroughly secured from inundation, and made dry, should be broken up, and put under a short course of tillage, and afterwards laid down to permanent grass.

The most effectual process for the improvement of pasture in the condition spoken of above would be to pare and burn the surface during summer, and after being ploughed in autumn, and thoroughly worked by grubbers and harrows in the ensuing spring, to be sown with rape, manured with the ashes produced by the burning, which in the meantime should be kept perfectly dry, and the crop fed off with sheep. The rape should be succeeded by potatoes, which should either be consumed by stock or sold; but if the potatoes be sold, the proceeds of their sale should be expended in the purchase of extraneous feeding materials for stock, or in that of artificial manure.

The crop of potatoes should be followed by turnips to be fed off with sheep. After the turnips, the soil should be thoroughly worked, by repeated operations of grubbers, harrows, and rollers, and all root-weeds carefully picked out during the ensuing spring and summer, in order to produce the finest tilth and cleanest condition of the soil; and, towards the completion of which, a copious dressing of lime should be applied, and the land sown with a selection of grass seeds properly adapted to the nature of the soil during the ensuing August or September, *without* a crop of corn.

While the above-described process is in progress, a compost, consisting of the following ingredients, and in the proportion specified in bulk or measure, viz.:—

Well-screened and clean soil,	8 parts.
Fresh-burned lime-shells, .	3 „
Common salt, . . .	2 „
Thoroughly-rotted muck, .	4 „
Mixture of equal parts of guano and dissolved bones,	1 „

should be prepared for dressing the seedling grass. The ingredients of the compost should be made into a heap in thin layers or strata, in which the lime and salt should be brought ontact, but the muck should be sepa- from the lime by a stratum of soil. eap should be allowed to remain in rrangement of its ingredients for seve- onths, until the lime has thoroughly and combined with the salt; after , it should be turned and re-formed. rning and reforming the heap, the in- nts should be promiscuously mixed er, and the exterior of the previous thrown into the interior of the re-formed The turning should be repeated at twice at the intervals of about two s, by which the ingredients of the st will be thoroughly blended.

e first crop of newly-laid down grass l be heavily rolled in mild and dry er in the spring, and mown for hay ds the end of June; and as soon as the removed, the above specified compost l be applied at the rate of from 12 to bic yards to the acre, on which about of grass seeds to the acre should be and the ground heavily rolled. After st crop, the new grass should be *lightly* tured, exclusively by sheep in a fatten- te, until a thick and sound sward be ished, when it may then be depastured mer by fattening cattle, and in winter ep. Both descriptions of stock should ultaneously fed with oilcake or corn. d there, at any future time, be any om of decay or retrograde condition of erbage of the new pasture, it should dressing of compost, in which lime, issolved bones, and guano should be in proportion. When stocked with cattle, anure dropped by them, and also the casts should be carefully scaled and l equally over the suface in spring and n, when the surface of the ground l be well brushed.

h an elaborate process in laying land ss as that described above, may appear ny persons to be unprofitable, but such wever, really not the case, as the first in obtaining a really good and per- t new pasture must be great indeed it is not compensated by future advantage; and almost whatever the cost may be, it will soon be recouped with profit by a progressively increased production.

So important and critical an operation as forming a new pasture should, in most cases, be undertaken by the owner of the land, and a description of the operation appears in this place as an improvement by the tenant on the supposition that sometimes there may be tenants possessed of such enterprise as to be induced, on a lease for an extended term and with liberal covenants, to undertake the improvement of the description of pasture now being treated of, in a proper and effective manner. The resource for maintaining an increased stock, both of cattle and sheep, to be obtained from the above-described means and management, would, in any case, be very considerable, if not very great; and if the extent of valuable land throughout the United Kingdom, damaged and rendered comparatively worthless by the inundation of it by rivers and smaller watercourses, could be exactly ascertained, it is probable that their improvement would be found to be a source of supply of animal food to the people of this country, not only of considerable, but of very great importance.

We shall now glance at the pastures in in upland districts. These grazing grounds form by far the largest proportion of the green pastures in almost every district of the United Kingdom. The lands that may be included in the catagory of upland pasture occupy every situation above the level of the alluvial formation of soil, which has already been the subject of the latest preceding remarks, to the most elevated downs and wolds. They also comprise a very great variety in the nature and quality of soil; and there is, moreover, great difference in their condition, which will require a difference in the means and management for their improvement to be adopted. In any case, however, it would be far from advisable to convert their present state of pasture to permanent tillage, or alternate husbandry of sown grass and tillage, as such lands are the main source of dairy produce, and of the best wools produced in the kingdom; although it will be necessary, as the most effectual means of their improvement in some cases, to be noticed presently, to break them up for a limited period, and then to lay them down again in a renewed state. Although the grades of the state of condition in which upland pastures are to be found may be, and probably are, very numerous, yet, for the purpose of the present remarks in suggesting means for their improvement, it will be sufficient only to divide such difference of condition into three classes—viz., the worst; those not so bad; and those comparatively good, but capable of great and marked improvement. These will now be separately treated of, in the order in which they have been mentioned.

First, of upland pastures in the worst state of condition, it may be remarked that there are numerous areas of grass land to be found in many localities in most districts of the United Kingdom, in the herbage of which, from previous bad management, the best of the plants have died out and given place to moss, weeds, or grasses of the most inferior description. Such lands it will be necessary to break up in portions in succession, in which the process will have to be varied with the circumstances of the nature and quality of the soil. Where the soil is of a clayey nature and of considerable depth, the surface may be pared and burned, and sown with rape, manured with the ashes produced by burning the surface, mixed with lime, and the rape succeeded by a crop of turnips, manured with dissolved bones or guano, or with a mixture of both, and both crops eaten off with sheep. After the crops in question have been consumed the soil should be thoroughly cleaned by the [illegible] grubbers, harrows, and rollers during [illegible] summer and sown [illegible] planted [illegible] without a crop [illegible] treatment [illegible] should be [illegible] the same previously recommended for renewed pasture on alluvial soils. We are aware of the disfavour in which the burning of the surface of land is generally held, and it is only on those of a clayey nature, of considerable depth, and bearing a rank and coarse herbage, and of peat soils, that the practice is to be recommended, in which cases, with proper after-treatment, the burning of land is unquestionably the most effectual means of its improvement. On the contrary, on thin and light soils the practice is to be deprecated, as on such, instead of being an improvement, it would certainly be the means of insuring the lasting deterioration of its fertility. Dry upland pastures, of thin and light nature, will be more properly broken up with a crop of potatoes planted on the sward in the lazy-bed mode of cultivation, manured with soot and salt, to be succeeded by a crop of turnips manured with dissolved bones or guano, or with a mixture of both these fertilizers, and both crops eaten off with sheep, and the after-treatment of the land to be the same as previously directed in the other cited cases.

Secondly, another class, as regards condition of the herbage, may not be so bad as that previously treated of, and which may be greatly improved by being scarified by an implement specially adapted for the purpose, which should then be heavily top-dressed with the compost previously prescribed in the first paper, and seeds of grasses of a valuable description for pasture, in which the herbage of the pasture in its unimproved state may be deficient, should be brushed into the compost, and the land should then be heavily rolled. The operation described should be executed in August, after the ground has been heavily stocked and eaten bare during the summer. The improvement should be followed by the land being stocked with sheep and young cattle, with precautions being taken against the new layer being injured by being depastured.

A cogent reason may be adduced for a recent layer of pasture not being stocked with sheep—viz, the close bite of these animals injuring the crowns of the pasture plants; also, to its being despastured, especially in winter, by cattle of any description when the surface is in any degree tender, from the ground being liable to be poached into holes by the tread-

›f these animals. Perhaps, all circum- :es considered, the best application of a ıt layer would be its being mown every at an early stage of the growth of the ;, the ground being heavily rolled after ·emoval of the hay, and the aftermath de- ıred by calves or yearling cattle, only ıg dry weather, in summer or early in mn, until the permanency of the grass be established, when the land may be as pasture for either cattle or sheep in a ning state. When the new layer is ap- to the purpose of being mown, it should ›p-dressed in early spring in each year the following mixture, recommended by Mr Lawes of Harpenden, Rothampstead, Herefordshire, as a manure for natural grass to be mown, viz. :—

Peruvian Guano	1½ cwt.
Nitrate of Soda	of each ½ ,,
Sulphate of Ammonia	
Common Salt	2 ,,

such quantity being for 1 acre.

Thirdly, there may be some of the upland pastures, now the subject of remark, that may be in such condition as not to require any further improvement than their being top-dressed with the compost previously described, and stocked with sheep, simultaneously fed with oil-cake or corn.

GRASSES FOR PERMANENT PASTURE.

No. V.—FESTUCA DURIUSCULA* (*Linnæus*)—Hard Fescue-Grass.

SYNONYM—*Gramen tenue duriusculum* of Bauhin, 1671.

DESCRIPTION.

OOT perennial, fibrous in some varieties, and somewhat creeping in others; leaves very numerous, but not tufted, drical involute, or wire-like, more or less and flexible, while those of the stems ›roadly flattened. Stems four or five- :d, rather upright, smooth, slightly fluted, ıveraging about 2 feet in height; panicle st erect, and mostly spread to one side; lets about six-seeded, each being set in yx of two unequal valves; seeds shortly d, the awn in each arising from the point ıe outer and larger palea or adhesive This is the most important pasture belonging to the narrow-leaved, or Fescues, as they are sometimes desig- ; and it is one of the most variable of e grasses in size, habit, colour, and ture, as will be further noticed under *Varieties.* It usually flowers about the middle of June, and ripens its seeds in from three to four weeks thereafter.

NATURAL DISTRIBUTION.

This is one of the most widely-spread grasses, being common throughout the temperate as well as the colder regions of both the northern and southern hemispheres. In Great Britain, it abounds in all dry natural meadows and pastures under altitudes of about 3000 feet, and its prevailing presence is invariably deemed indicative of good, sound, fattening herbage.

QUALITIES AND USES.

Although less bulky than many others, the hard fescue is admitted to be one of the best natural pasture grasses, and its presence in meadow hay is deemed a sure indication of its superior quality. As a pasture grass, it is liked by all kinds of stock, but more especially by sheep, its seed stalks being generally close eaten down while those of ryegı

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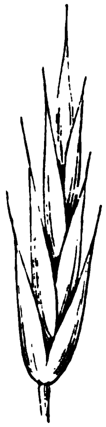
rom the Celtic *fest*, pasturage, and the Latin *ulus*, hardish.

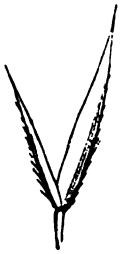
and crested dog's-tail grass are allowed to stand and wither. Its root-leaves, which retain much of their greenness in winter, are abundantly and continuously produced from early spring through the growing period of the year, and they are better calculated for

[illegible] growth [illegible]sisting [illegible] than those of most other grasses, [illegible] property which, taken in connexion with their close matting and spreading growth, as well as their capability of withstanding much traffic or trampling, renders this an indispensable grass for fine lawns, and especially for cricket, croquet, bowling, and bleaching-greens, as is further proved by its abundant presence in all the best, much-frequented grounds on which these games are practised. Possessing all these qualities, and looking to its now extensive cultivation, it may seem strange that the hard fescue does not appear to have been specially recommended before the present century, although there is strong presumptive evidence that Dr James Anderson, of Monk Hill, Aberdeenshire, and other earlier authors, confounded this with the F. ovina, and ascribed to that comparatively unimportant species the most valuable properties which strictly belong to the F. duriuscula. In the Woburn grass-garden, the produce at the time of flowering, from a clayey loam with manure, was at the rate of 18,377 lb. per acre of green grass, and 8269 lb. of hay; while at the period of seed ripening, the green produce was at the rate of 19,057 lb., and the hay 8575 lb.; and the after-math, consisting entirely of root foliage, weighed at the rate of 10,209 lb. per acre when cut, which products, it may be remarked, more than doubled those of Pacey's ryegrass, grown at the same place on a rich brown loam.



Spikelet magnified.

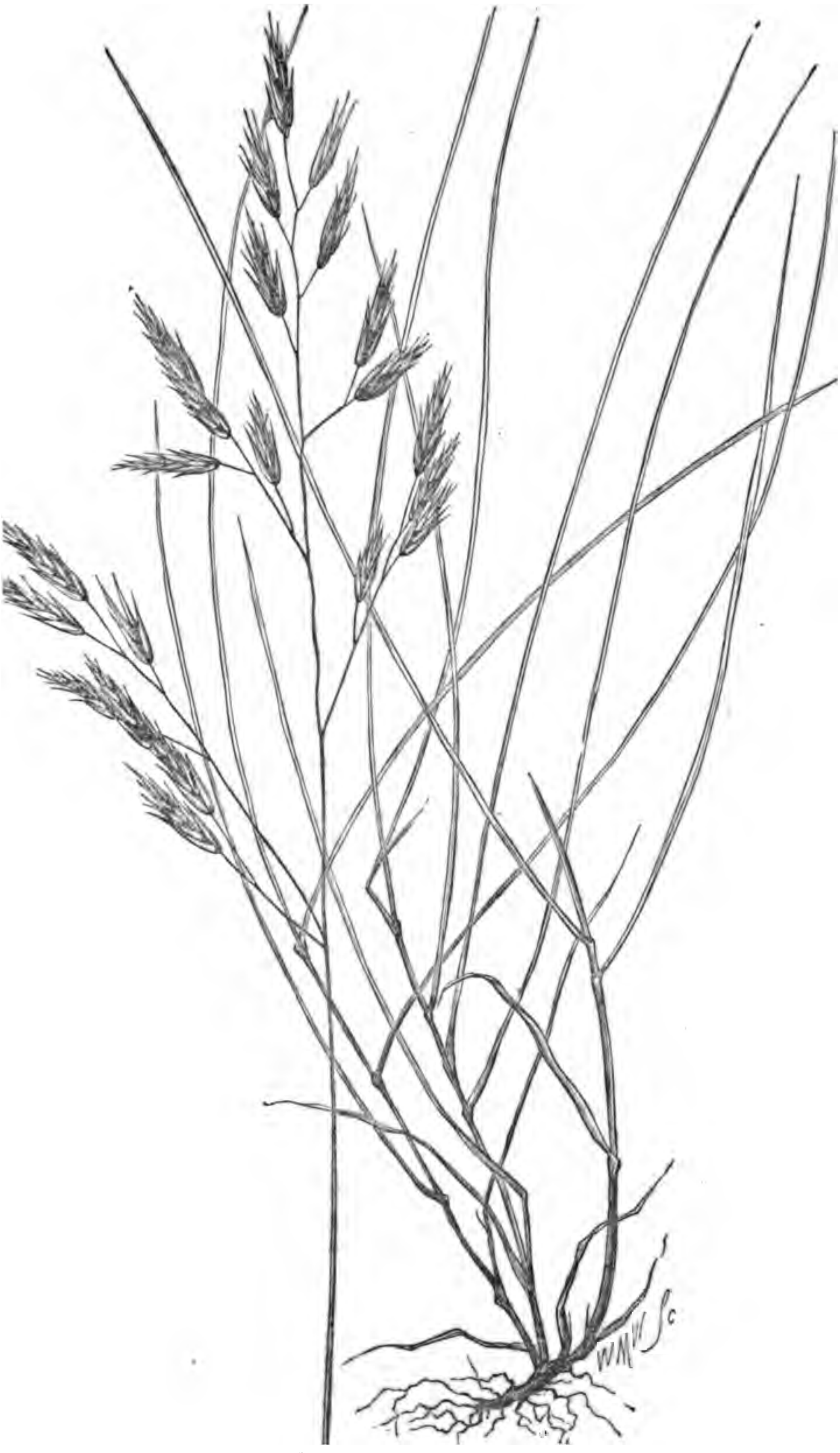
Floret magnified.



Calyx magnified.

SEED AND SOWING.

The seeds average only about 10 lb. in weight per bushel, and about 39,000 are contained in a single ounce. The greatest number braird when covered with about a quarter



Festuca duriuscula—Natural size.

of an inch of soil; only half of that quantity when the covering is from ¾ to 1 inch, and none come up when the covering is 2¼ inches. Hence the soil requires to be well pulverized before sowing, and the seed covered in after, by a roller or a very light harrow. For sowing a single acre without any other mixtures, 20 lb., or about 2 bushels, may be allowed. From 3 lb. to 5 lb. per acre may be included in mixtures for permanent pastures, and at least double that quantity in mixtures that are intended for lawns, croquet-greens, &c., a purpose for which, in scythe-cutting days, it was deemed unsuitable, in consequence of the difficulty of mowing its hard wiry foliage, which, however, is now found to be eminently adapted for machine-cutting.

CHEMICAL ANALYSIS.

The following were the results obtained by Professor Way:—The hard fescue, collected when in flower from meadows in the neighbourhood of Cirencester, in a fresh state—Water, 69.33; albuminous or flesh-forming principle, 3.70; fatty matters, 1.02; respiratory principles, starch, gum, sugar, 12.46; woody fibre, 11.83; and mineral matter, or ash, 1.66. In a dry state—Albuminous or flesh-forming principle, 12.10; fatty matters, 3.34; respiratory principles, starch, gum, sugar, 40.43; woody fibre, 38.71; and mineral matter, or ash, 5.42.

VARIETIES.

None of our native pasture grasses present such diversity of form, size, colour, and habit as F. duriuscula and its varieties, which run into those of the allied F. rubra in such a manner that botanists have found it impossible to define where those of the one end, [illegible] begin. A good agri- [illegible] ever, exists in the [illegible] spreading roots of the [illegible] more spreading roots [illegible] classify the [illegible] such great diversity [illegible] exists, it follows that, by careful selection [illegible] some highly improved sorts might be got, and this was actually accomplished nearly forty years since by the late Mr Thomas Bishop, then factor at Methven Castle, Perthshire, than whom none devoted more attention to the improvement and cultivation of the natural grasses. Mr Bishop discovered Nos. 6, 7, and 8 of the following varieties, which for some time obtained a place in seed-growers' fields, and seedsmen's catalogues, although it is doubtful if any of these can now be got in their original purity, unless in the permanent pasture parks at Methven, which were once the subjects of his experimental cultivation.

1. *Festuca duriuscula filiformis*, or slender hard fescue-grass.—Described by Dr Parnell in his "British Grasses," as being taller and more slender than the ordinary form of the species, and in having its panicles gracefully drooping. It is found in rich soils, by the sides of lanes, hedges, and in shady woods; but possesses no superior properties to recommend it to propagators.

2. *F. d. glabra*, or smooth hard fescue-grass.—This is the F. glabra of Sinclair, who described it as differing from F. duriuscula in having longer awns, longer root-leaves, more shining spikelets, and in being smoother in all its parts; as well as in being earlier, finer, and more succulent, but inferior in bulk of produce, its yield, according to his experiments at Woburn, being, at the time of flowering, from a sandy loam with manure, only equal to 14,293 lb. of grass, and 5717 lb. of hay per acre, while the aftermath produced at the rate of 6125 lb. of grass.

3. *F. d. glauca*, or glaucous-leaved hard fescue.—A variety of no economic importance, found occasionally on sea-shores, distinguished by the glaucous colour of its leaves, and often present in bowling-greens, and others which have been formed of sea-side turf.

4. *F. d. hirsuta*, or hairy-panicled hard fescue-grass.—This is the F. dumitorm of some authors, and the F. pubescens of others, and is distinguished by having its straddling or irregularly-formed spikelets covered with fine whitish hair or down, as well as in its roots being often somewhat creeping, although less so than those of the downy form of rubra. It is occasionally found

ds where the soil is dry and sandy
; no merits to recommend it to culti-
being, according to the Woburn ex-
nts, very deficient to the ordinary F
ula at all stages of its growth; the
e at flowering, from a rich black sandy
ving only been at the rate of 10,890 lb.
, or 5445 lb. of hay, and 4083 of latter-
er acre.

d. humilis, or dwarf hard fescue-
-An unimportant dwarf-growing vari-
scribed by Dr Parnell in his "British
," and found in upland glens.

d. purpurata, purplish hard fescue-
-The most productive of the varieties
l by Mr Bishop, and well adapted for
ay or pasture. Its name is descrip-
its general colour, and is especially
ble to its stems and panicles, which in this respect bear a considerable resemblance to F. rubra, from which, however, this variety differs in having more fibrous roots, and producing a much greater abundance of stalks.

7. *F. d. præcox*, or early hard fescue-grass.—A purplish-coloured, very early, and useful variety for spring pastures, but deficient in bulk of produce to either the last or next variety.

8. *F. d. serratifolia*, the serrated or rough-leaved hard fescue-grass—Was so named from a peculiar roughness on the margin of its unusually long leaves, which is distinctly felt on drawing the fingers downwards over them. Sheep are particularly fond of this variety, and it is remarkably suitable for lawn pastures, in consequence of the pleasing green colour of its foliage, which is retained in unusual freshness throughout the winter.

MAKING AND APPLICATION OF FARM-YARD MANURES.

a time, like the present, when high
farming is becoming universal—and
arguments tend to shew that it pays
han any other sort of farming in the end
bsolutely necessary that the making and
tion of farm-yard manures should be
, with the view of bringing the land on
he manures are applied to the highest
perfection, within the limits of possi-

, as to the method of preparing farm-
anure. It is composed, as every one
of straw and other vegetable matter,
with excrements of horses and cattle.
e remarks we do not wish it to be
ood that we advocate the system of
ing the whole of the straw on
stead into food for cattle, but,
same time, we contend that
etter the food administered to
imals, the higher the quality of the
will be, because oil and feeding-cakes
a vast amount of nitrogen, which is
of producing ammonia. The first point we conceive essential to the successful preparation of manure is, to have a place completely covered in by a roof, supported by pillars, wherein to deposit all matters which are to be converted into manure. At the lower extremity of this shed, a tank ought to be made, so as to receive all the liquid manure which flows from the general collection, because if it is allowed to run down the roads and ditches, instead of being of practical utility, it becomes an eye-sore and an offence. But the question naturally arises: If the manure be covered in from the rain, where will the liquid be obtained to assist in decomposition? To this we reply, there will be at all times a sufficiency in the tank below, which, by being pumped up at given intervals, say once or twick a week, will hasten decomposition much more than heavy rains would do, and with much less loss of the manurial constituents. Drains should also be constructed to carry off the urine from the stables, byres, and piggeries into the common receptacle. If this be effectively executed,

there will not only be liquid enough to carry out the fermentation and decomposition of the whole collection, but there will be a considerable surplus, which may from time to time be applied to a compost heap formed of ditch-scourings, road-scrapings land-weeds, &c., collected for the purpose, thus forming a capital manure for top-dressing pasture and meadow lands. Cattle should always, when practicable, be fed in byres or close sheds, rather than in open folds, as the manure loses, by exposure to sun, wind, and rain, the elements which constitute the very life of young plants. Many farmers are in the habit of leading' out their manure into the several fields where it has to be used, when they have a little spare time, as in the case of a hard frost, and there it has to remain in heaps till the time arrives for its application. It is then put into the land in a cold state, often in a dry and exhausted state, thus economizing labour at the expense of manure. This leads us briefly to consider the application of manures. As a rule, surface manures should be applied at the close of the year, and root manures in the spring; or, in other words, on green land at the decline of the year, on red land at the commencement of the growing season. The reason for this is obvious. Towards the latter end of the year the sun has lost a great deal of its power, rains and night-dews are frequent; so that there is little danger of the ammonia making its escape, while the rains wash it into the roots of the plants. A good top-dressing is invaluable to grass seeds. It serves to protect them from the severities of winter; it promotes their growth internally—that is, at their roots; while in the spring the young plants will shoot out vigorously with broad fleshy leaves, and arrive at maturity from two to three weeks before the ordinary time. The next thing to be considered is the application of manure to root crops. The best time is undoubtedly the spring, when the crops are planted. It ought then to be carted directly from the farm-yard, while in a fermenting state, and no time should be lost in getting it covered in. It is a great mistake to have it spread out upon the land for six or eight hours in the middle of the day, exposed to the scorching rays of the sun, as it thereby becomes comparatively useless. A good plan is to lead all manures in the spring to the field early in the morning and late in the evening, resting during the heat of the day.

If these hints were carried out, there would be less necessity for using artificial manures; indeed, to many it seems absurd for practical men to pay such enormous prices for artificial manures, while the very cream of their own farm-yard manures is floating to the rivers, and wafted away on every passing breeze.—*A.*

THE COATING OF SEED WITH MANURE.

[illegible] knowledg[illegible] When [illegible]vanced, in addition [illegible] experiments of practical men brought to test its truth, the investigations of the agricultural chemist is also readily ob[illegible]ned [illegible] determine its bearings, and the limits within which the system propounded is likely to hold good. The idea of steep[illegible] manuring is not new, for it has been several times brought before the British farmer during the last hundred years; but so extravagant were some of the notions promulgated by some theorists in this department, that they carried their own refutation with them. Some quarter of a century ago, for example, M. Bickes, of Germany, affirmed, in giving expression to his success, that "he

ied plants of wheat, consisting of fifty-
l fifty-seven stalks, potatoes above 7
gh, and tubers in proportion; and sun-
; 11 feet high, with flour discs 14 inches
.meter, and seeds as large as coffee
" This gentleman, after giving further
;, produces testimonials as to the effi-
of his method from practical men in
s parts of Germany in relation to the
1829, 1830, and 1831. These testi-
.ls speak as to the giant crops grown,
he increased number of stalks from a
seed; and though they are undoubtedly
:d to some weight, they fail to give such
e acreage returns as would satisfy the
ements of the British farmer in his more
te way of detailing experiments.

ı years ago the writer was induced by
te Mr Ronald of Glasgow, a respectable
India merchant, to try the coating of
and roots before sowing and planting,
several fertilizing ingredients. Mr
ld himself, after a series of accurate ex-
ents on a small scale, extending over
:ars, found that his crops were greatly
than those to which no application had
made. His statements received a par-
ublicity at the time in a commercial
paper, but, so far as we are aware, they
ıued unnoticed in any agricultural news-
or journal. It may, therefore, be in-
ing to give a short outline of his process:
:hief alimentary substances employed by
were a solution of Irish lime and water,
ıtion of byre manure, a solution of hen-
:ity sewage, and soot and water. He
used sugar with great advantage, not
as a useful manure, but also on account
glutinous nature, in adhering to the
better than anything else. His method
ıting the seed was as follows:—Take a
ay 30 inches diameter, and 2 feet deep;
r into it a boll, or 4 bushels, of wheat;
8 lb. of sugar, bruise any lumps that
be in it, and sprinkle it on the top of the
. Take another tub, 2 feet in diameter
½ foot deep; put into it 6 gallons of
, and mix soot with it, until it is as thick
od cream, then, with a jug, distribute the
on slowly on the top of the sugar and
. The liquid will then be about 2 inches above the level of the wheat, and the whole mass is to be stirred several times during the first four hours. After remaining fourteen hours, the liquid is entirely absorbed, and the grain is sown without loss of time.

Such are the outlines of Mr Ronald's method of preparing his steep, and the writer scrupulously followed his directions. The experiment was wrought out with success in a field of oats in the season of 1859. The one half of the field, which consisted of a light, generous soil, ploughed out of lea, was sown with Sandy oats, dressed in the way stated, and the other with the same variety of oats, without any coating. The two divisions were harvested and stored separately, and when thrashed and winnowed, the former shewed an extra produce of 6½ bushels per acre. The succeeding year was not attended with the same success, so far as the experiment was concerned, for, untoward weather having set in, the different portions of the field were carried hurriedly during dry intervals, and mixed up together in stacking. Details of after experiments will be subsequently given, as well as some trials that were made by several farmers in Ayrshire.

Two other experimenters in this particular department brought themselves prominently before the agricultural world some twenty or thirty years ago, who deserve more attention than the German referred to, for they, like Mr Ronald, describe the materials they used, and the methods they adopted in preparing the seed. Still, it cannot be denied that men whose opinions are worthy of all consideration, deny the possibility of good results from the coating of seed. Dr Voelcker, who is no mean authority, affirmed that seed-manuring was not based on rational principles. He published some seed-steeping experiments in the *Journal of the Royal Agricultural Society of England* in 1857, in which he engaged solely with the view of determining the various stages of germination resulting from the different applications, discarding altogether the idea of augmenting the crop by these appliances. No doubt this celebrated chemist, in looking at the many failures in seed-manuring in previous attempts, had been led to express himself unfavourably of the whole matter, without considering that there might remain untried alimentary substances, whose application might meet, and to some extent satisfy, the requirements of the plant. Professor Johnston, on the other hand, asserts his belief that considerable benefit may accrue from the use of sundry steeps. Indeed, the fact is undoubted, and has been evinced by careful experiments. It may be further asserted that the plan of causing every seed to carry with it to its bed in the earth some good manure stands to reason; and the fact that saccharine matter is developed in the germinating process, leads naturally to the conclusion that an increased supply of this substance would be beneficial. But even although the scheme were not based on specious principles, or although its action were incapable of a scientific explanation, that would be no good ground for abandoning experiments, or relinquishing all research in that direction. The Glasgow gentleman already referred to experimented for ten years, and delayed giving the outside world any knowledge of his proceedings till positively reliable information could be advanced as to the materials best adapted for securing success, and the best mode of their application. In the progress of the growth of the crop, the superiority of the dressed grain is in most cases very marked. In early-sown fields, on weak soils, with barren weather, corn yellows in the *swoon*—that is, when the nourishment of the pickle is exhausted. At this stage in the growth of the plant, the benefit of the coating is at once apparent, especially if sugar has been one of the ingredients used in the dressing. The embryo plant otherwise languishes in its first searches after food external to the pickle. The sight of the sickly plants at this period, under the conditions we have assumed, as compared with the manured seed, would convince the most incredulous that good was to be derived from the scheme. To assert, as some sanguine advocates have done, that, by adopting this process, the farmer may dispense with the ordinary manurial applications, and yet have a large crop, is quite absurd. A grain of alimentary matter in contact with the seed, cannot extend its influence through the whole period of the growth of the crop. It can only be rationally viewed as an *auxiliary*, and not as a *substitute*, for ordinary farm-yard manure, or such artificials as are in other circumstances applied to the crop. The main obstacle to the constant success of the experiments of the writer was an excess of rain before and down to the stage of the growth of the plant to which we refer. This, it is thought, is due to the solubility of the ingredients used—passing away by solution and filtration, especially in porous soils, before the period of *sitting* in cereal crops. Most farmers may recollect of the want of the expected success of the patent manures of that celebrated chemist, Liebig; and it has been asserted that that arose from the difficulty of adjusting the soluble and insoluble ingredients from cheap materials. It must be obvious to all, that if an alimentary material is too soluble, the plant is soon deprived of its food by the washing down of the rains; and, on the other hand, if it is not readily soluble in water, it cannot be available as plant food; and unless, as in nature, a medium is attainable, the manurial ingredients are of less value. It should be observed that in the selection of the materials for the steep, nitrogen should be always included. It, however, must be used with caution, else, like a farmer of our acquaintance, who, in experimenting with guano after the method proposed, destroyed the vitality of his seeds.

The writer has watched and examined with great interest the primary and secondary rooting of cereal crops; and the bulk and yield of the future crop are ever largely dependent on the occurrence of fostering weather at the stage when the seminal roots and seed cease to yield food to the plant, and when the coronal rooting, which draws nourishment from a different stratum of soil, begins to provide food for its development. The stage when the seed-supply of nourishment ceases is always critical, and often there is a great loss of plant in sterile soils, and those holding noxious ingredients. But though there may be no loss of plant, if the process is protracted by unpropitious weather, the crop is rarely prolific.

THE SUPPLY AND COST OF NITRATE OF SODA.

THE supply and cost of nitrate of soda is a question of great importance to the agriculture and manufactures of this country, and it is a question that has lately assumed greater prominence from the use of the product in the manufacture of the best iron and steel under the Heaton patents. At the present moment the subject is a little in the background with respect to the advantages of nitrate as a manure for our corn crops; yet it appears to be the only substance that can successfully compete with guano. The late Mr Pusey, who was the greatest authority of the day in practical agriculture, calculated that nitrate, even when the price was £16 per ton, yielded wheat at a cost of 24s. per quarter; and that if it were cheapened to £8 per ton it would yield it at 12s. per quarter. "Thus," he contended, in his well-known paper in the *Journal of the Royal Agricultural Society*, "instead of 3,000,000 quarters of wheat, costing £6,000,000 sterling, we might import yearly 200,000 tons of nitrate, costing little more (at £8 per ton) than £1,600,000 only, and so our farmers might obtain from their own farms the whole foreign supply of wheat without labour, and with but a few month's outlay of capital." In other words, Mr Pusey held that the use of nitrate would render us comparatively independent of foreign imports of wheat. We well remember the satisfaction which this view created, and that it gave some impetus to the trade in nitrate. But, from various causes, little came of the movement. Though much reduced in cost, the article is still too dear to compete with guano, chiefly from the cost of shipment and freight. The application of this substance to the Heaton manufacture of steel and iron will, however, increase the demand for it, and probably be the means of developing a great and profitable trade. It is well known how important nitrate of soda is in its application, under Mr Heaton's process, in converting the poorest ores into the highest qualities of metal; and this use has naturally drawn attention to the supply of the article. The chief deposits are in Peru, where they are inexhaustible. They are at no great distance from the port of Iquique, which, it will be remembered, was nearly destroyed in the late earthquakes, in a district of which a place called La Noria is the capital seat of the manufacture. The distance between the mines and the port is only 23 miles, but before the earthquake the cost of conveyance to port was not less than £2, 3s. per ton, notwithstanding which the cost to the importer for freight, transport to Europe, mining, and manufacture, was but £8, 13s. 10d. per ton, a cost which left a fair margin for profit on the lowest market price of £10 per ton. The present temporary famine price is due to the destruction of the shipping engaged in the trade, and the stores of nitrate at the port; but it would seem inevitable that the price should very shortly be reduced considerably below the lowest rates that have heretofore obtained. The sources of supply being inexhaustible, the rapidly increasing trade competition can have no other effect. In this respect the position is exactly analogous to that taken by Mr Pusey, but the movement is in better hands, and it will succeed. It has been suggested by Mr William Lloyd, the civil engineer, who has for many years been in professional connexion with this question, that a single and inexpensive tramway should be made from Iquique to the mines, and a mole built for the shipping to load alongside. These improvements would cost not more than £250,000, but they would reduce the cost of the nitrate £2, 11s. 6d. per ton, so that it could be laid down in England at £6, 2s. 4d., instead of at £8, 13s. 10s. per ton. Suppose the shipments amounted to only 108,000 tons per annum, this saving would pay for the railway in one year. These considerations will doubtless have due weight, not only upon the commercial, but upon the agricultural mind. Peru, however, is not the only country in South America that affords natural deposits of nitrate of soda. They have been discovered in the north of Chili, near the Pacific coast, in quantities sufficient to offer the prospect of a further reduction in the price of at least 20s. per ton.

A SYSTEM OF HUSBANDRY TO INCREASE THE HOME PRODUCTION OF FOOD.

CHAPTER FIRST.

THE position of this country, as to the supply of *home* production for the rapidly increasing population, cannot be contemplated without anxiety, or perhaps without alarm. Since about the middle of the last century until the present time, the production of home-grown corn has every year been inadequate to the consumption. In fact, during the present and three last preceding decades of the present century, the progress of the average of the annual deficiency has proceeded with a greatly accelerated rate of increase; and it may, perhaps, be matter of interest, though far from being of a pleasurable character, to trace the progress of the deficiency referred to, from the time that Britain ceased to produce a superabundance of grain, and was, therefore, an exporting instead of an importing country as it now is, of a large portion of the food of the population.

The average annual importation of wheat and wheaten flour, during the decade ending 1770, was upwards of 94,000 qrs.; that during the decade ending 1780 was upwards of 110,000 qrs.; and that during the decade ending 1790 was upwards of 143,000 qrs. The annual importation during the last decade of the eighteenth century, and those during the three first decades of the nineteenth, were remarkably uniform, and the mean of the whole was about 100,000 qrs. The average annual importation during the fourth decade of the present century, exceeded 900,000 qrs. The average annual importation of wheat and white flour, during the years ending 1850 was nearly 3,000,000 qrs., in which the lowest was 1,064,269 qrs. in 1843, and the highest 4,856,039 qrs. in 1850. The average annual importation during the decade ending with 1860, rose to upwards of 5,500,000 qrs., in which the lowest was 3,211,766 qrs. in 1855, and the highest 7,334,163 qrs. in 1860. Since the last-mentioned period, the annual importation of bread-stuffs have been severally upwards of 8,670,000 qrs. in 1861; upwards of 11,600,000 qrs. in 1862; upwards of 7,100,000 qrs. in 1863; upwards of 6,400,000 qrs. in 1864; and about 21,000,000 cwts. in 1865. It should here be remarked that the wheat crops throughout the United Kingdom in 1863, 1864, and 1865 were a succession of excellence both in quality and yield; so that of late years the importation from abroad of bread corn required to meet the deficiency in the supply of that of home growth has risen to a very large proportion of the consumption of the population of the kingdom. Such a state of things not only places a country at a great disadvantage as to its political economy, in being obliged to purchase from producers in foreign countries that which ought, if possible, to be produced at home, but, being dependent to so great an extent on foreign production for the first necessary of life, is, moreover, a position of very great danger to the importing country of the horrible evils of a scarcity of food for its population.

Besides the great deficiency referred to in the home production of the vegetable food of the people, this country is as much, if not to a greater extent, dependent on foreign supplies of animal food. At least, the increase of importation of cattle and sheep from abroad has been more rapid than that of corn, as the following statement from the returns of the Board of Trade since 1860 will shew:—

	Cattle.	Sheep.
1860	106,569	320,219
1861	107,096	312,923
1862	97,887	209,472
1863	150,898	430,788
1864	231,733	490,243
1865	283,171	914,170

It will be seen by the foregoing statement that the importation of both cattle and sheep has been nearly trebled in the short interval of six years between 1860 and 1865; and there is reason for belief that at the present time the importations of live-stock from abroad is nearly one-sixth in number of cattle, and one-ninth in that of sheep, of the entire consumption in the United Kingdom. The necessity for so large a supply of foreign stock to supplement that of home production is a matter of even more grave import than the dependence on foreign supply of vegetable food which exists in this country to such an alarming extent, from the liability of introducing contagious disease with live stock imported from foreign countries, in addition to the disadvantages attending a dependence on a supply of grain of foreign production, and which apply equally in respect to a dependence on a supply of foreign cattle and sheep for food for the people. As to the evil arising from the liability of the introduction of contagious disease by the importation of live stock from abroad, the inhabitants of Britain have had the most lamentable experience during the past three years. So far from a dependence on foreign supply being lessened by time, it will be increased, from the scarcity of cattle of home production occasioned by the devastation of the herds, and the secondary effects of the visitation of the cattle plague in this country during 1865-66, causing a diminished ability to meet the demand for the consumption of a rapid and accelerating increase of the population, unless the evil be alleviated by a complete change, and great improvement in the system of husbandry practised at the present time in any part of the United Kingdom.

That this country can, under any system of husbandry, or improvement, or extension of agriculture, possibly meet the requirements of the population in a supply both of vegetable and animal food of home production is extremely doubtful. If an independence of foreign supply of both cannot be attained, the energies of the husbandman of Britain ought to be directed to the production of a supply of cattle and sheep to meet the consumption of the people without the aid of foreign assistance, for the very cogent reason already adduced, rather than attempt the entire supply of grain with increased dependence on a foreign supply of cattle and sheep. With a view of increasing the cattle and sheep stock of this country, the conversion of a large portion of the land now under tillage has been recommended, and which has to some extent been acted upon in many parts of the kingdom. That such is not the best means for the remedy of the very serious evil referred to, many reasons may be adduced. With others of minor import and less cogency, and, therefore, unnecessary to be stated, the following will suffice to shew the fallacy of such a course being pursued. In the first place, laying land to grass after its application to the growth of grain crops for any lengthened period, is very seldom attended with success, but is generally a complete failure. Even when the grass plants appear to thrive and give promise of success at first, the most valuable of the description of the grasses die off after a few years, and give place to weeds or to an herbage of little or no value. Secondly, a much greater quantity of stock can be maintained on tillage, applied to the growth of crops for food for stock, than can be supported on an equal extent of ground, and of equal natural quality of soil in grass. And, in the third place, to convert land in tillage to grass would occasion a want of a profitable source of employment for the rural population in the neighbourhood in which the change might take place—a matter which, if it should become of any considerable extent, must be acknowledged by every one would have a most pernicious effect on the prosperity of the nation.

So far from laying land in tillage to permanent pasture being the best means of increasing the supply of cattle and sheep of home production, a contrary course would seem to be not only much more conducive to that end, but also in being most profitable to individuals occupying the land, and most beneficial to the community at large. The land at present in permanent grass which ought to be broken up and applied to tillage are those which, from defective management, such as successive mowing for a lengthened series of years for hay, depasturing by dairy cows, and by young stock in a growing state, without a compensating return of manure of a description to yield the principles of fertility removed by the means spoken of, are in a state of deterioration from their pristine fertility, and are rapidly approaching to almost utter worthlessness. Grass land in the condition described, generally occupying an upland or elevated position, is to be met with in almost every district of the British Islands, and its aggregate extent is very great. The most effectual improvement, and the most profitable application of such land, would be its conversion to tillage in the growth of crops, principally for the fattening of cattle and sheep. A rotation and scheme of management of the land just described, when under tillage, and equally applicable to old tillage land under a changed system of management, with a view to the increase of the supply of animal food of home production, will hereafter be proposed and discussed.

Then the course to be pursued for increasing the supply of cattle and sheep of home production, is to increase rather than diminish the extent of tillage land in the United Kingdom. There are, however, many cases in which it would be a decided disadvantage under any circumstances, both to the owner of land and the community at large, to convert pastures, either temporarily or permanently, into tillage. The category in question will include fertile and low-lying meadow lands, which, if out of condition, or otherwise requiring to be improved, ought to be top-dressed without their being broken up; land liable to inundation; craggy mountain pastures inaccessible to vehicles for conveying manure to them, or inconvenient to the working of implements of tillage. The last-mentioned description of ground may frequently be occupied with advantage and profit to the owner by being planted.

In order to increase the supply of animal food of home production, and on tillage farms, the present system of tillage husbandry should be greatly altered and improved. The most extended rotation of cropping now practised should be still further extended, and it should consist as much as possible of the crops adapted for the maintenance or fattening of stock, and in which the sown grasses in the rotation should remain unbroken up as long as they might continue to afford a profitable pasture. Whatever may be the cropping adopted, it should be such as to afford a suitable maintenance for breeding stock, for young stock being reared, and for more mature animals being fattened. The description of stock that would, under the system of management about to be proposed, be kept would depend, in great measure, if not entirely, upon the nature and character of the soil. Thus, should the soil be very light, the stock should be confined entirely to sheep; when of a medium character, the stock might be part cattle and part sheep; and the one or other description of stock would, perhaps, predominate according as such medium soil might incline to be light or strong; and where the soil might be decidedly of a strong character, then the stock kept might be entirely confined to cattle.

ON THE BREEDING AND MANAGEMENT OF CATTLE.

[Concluded from page 208.]

THE following is the remainder of Mr Duckham's lecture.

MANAGEMENT.

In managing the herd, the course pursued will, of course, depend upon situation and climate, and also for what purpose they are intended, whether for neat or dairy use. Great attention should be paid to having cows in calf treated quietly by those in charge of them, and in nowise to be excited by dogs used in driving them, as quietude alone insures success. As egards the milking properties of cows, I am of opinion that if an animal yields an excessive quantity of milk, it must have a lessening effect on her flesh; and to arrive at that mode of treatment whereby a race or herd of cattle will give a fair amount of milk, and, at the same time rapidly lay on fat, must ever form a subject worthy of the farmer's greatest consideration. As to the hand-rearing of calves, Mr James says:—"My system is to let the cows at so much per year to a dairyman, finding him in land and making the hay, the calves being reared by hand with skimmed milk and linseed tea until three months old, when I take to them, and allow a quarter's rent of the cow for the calf at that age; they are then turned into the pasture." And that gentleman assured me, in proof of the excellence of his system, that the beautiful pair of yearling heifers, winners of a first prize at the Hereford meeting of the Bath and West of England Society in 1865, were reared in this manner. Unless, however, a great amount of attention be paid in carrying out the system, extensive losses will inevitably follow from scour, husk, blackleg, &c., and the growth of the animals will be greatly retarded.

The practice of removing calves, when hand-reared, from their dams is extremely cruel, because the medicinal properties of the milk, and the rough action of the tongue, are each as beneficial to the health of the calf as the medicinal nature of the fluid with which the calf is invested is to its dam. After removal, the calf should have a supply of pure warm new milk three times per diem, commencing at 4 quarts per diem, and increasing the quantity with its age up to 7 quarts. When too long a period is allowed to elapse between its meals, the food is taken too eagerly, and consequently it passes undigested; and scour is promoted. At the end of the month the new milk may be reduced in quantity, and skimmed milk substituted, and, with increasing size, the further substitute of a mucilage of Irish moss. Two pints of linseed-meal and 1 of wheat-flour, boiled in 2 quarts of water, and then mixed with the mucilage, will be found a valuable feed. The food should be supplied in small quantities, but often, and the animals kept in clean warm beds, with plenty of light and ventilation. Classification of age and sex is also highly desirable. A cow having had three calves should be turned out to feed, inasmuch as every year she is kept beyond that period, she is becoming of less value in the eyes of the grazier and butcher; and as we may fairly calculate upon an equal amount of the sex being produced, there would be one-third of the heifers to draft annually to be fed with them. On turning them out to grass, I take the precaution of allowing them only to be out for a short period on the first day, gradually lengthening the time every day as they become more accustomed to it. I therefore escape any sickness arising from overfeeding or disarrangement of the body from too sudden a change of diet.

The calves intended for steers should be made so from six to eight weeks' old; and as they are very apt to lose condition whenever food is scarce, a little oilcake should be given.

That successful breeder and feeder of polled Angus cattle, Mr M'Combie of Tillyfour, Aberdeenshire, has told me that his practice is to allow the calves to run with their dams from six to ten months (he does not hand-rear any); that when his cattle have not a full bite of grass he allows the feeding animals oilcake on the pastures, and he always gives his calves from 1½ lb. to 2½ lb. per day of oilcake during their first winter; that he draws a strong cord through the dewlap as a preventive for blackleg, and under that treatment he has never lost any from that fatal complaint. He generally gives his feeding animals about 4 lb. of cake, and the same of crushed oats or barley per diem during the last six or eight weeks; and adds—"I must distinctly consider that all cattle intended to be reared, more especially calves, ought to be kept in open yards, with plenty of shelter to protect them from the inclemency of the weather, and plenty of dry litter. No doubt whatever, their confinement is against all natural laws, and must be very prejudicial to the constitution. Cattle that have been confined in the stalls or enclosed yards, lose condition at grass for at least two months, whilst those from the open yards improve the very day they are put out. What more proof is required?"

GENERAL HEALTH.

When a dryness of the hair over the shoulders and withers is displayed, I consider it indicates an inactivity of the liver, and a little medicine is sure to be attended with a good result. My remedy is 8 oz. of Epsom salts, 3 oz. sulphur, ½ oz. nitre, ¼ oz. ginger, in 2 quarts of warm water, given in the morning upon an empty stomach. A few days subsequently, 2 oz. of common salt, 2 oz. sulphur, 1 oz. gentian, 1 oz. aniseed, and some fenugreek mixed with the food; and my experience in this matter is that, when these remedies have been applied, they have had at all times the desired effect.

Upon the breaking out of the cattle plague I administered the same drench, and occasionally gave the powders, with very favourable results. Water, in my opinion, is most essential to the health of every animal; and when, as in many farms such is the case, the wash from the unspouted buildings, after passing through the manure, forms the only supply, the staring coat, the arched back, and shivering state of the animal, is clearly attributable to this lax state of matters. Such liquid cannot only be unhealthy to the animals compelled to drink it, but is the source of disease to those who live near where it is situated.

The food for fattening stock should, I think, be occasionally changed. My system is an allowance of best quality linseed cake, from 2 to 4 lb., given the first thing in the morning, followed by three feeds during the day of hay, chaff, meal, and pulped roots, and a little hay at night. I am particular in not giving excessive quantities of cake, as my belief is that no animal can derive the full amount of benefit it is calculated to produce when over-supplied. I like to reduce all corn to a fine meal, and mix it with the chaff and pulped roots some twelve hours before using, when a slight saccharine fermentation will take place. By these means the digestive organs of the animals will derive the full benefit of its food. At the same time, I think an occasional change of the kinds of corn and manner of giving roots is very desirable, and would be attended with favourable results.

The year 1864 was one of great trial to the stock-owner. Finding it impossible to carry on my usual system of winter keeping, on account of the failure in supply of hay and crop of roots, I substituted straw chaff for hay chaff, and in place of roots, made linseed tea, applied boiling hot on the chaff, with a little salt and meal added. This, with a little hay in the rack, constituted their feed, and I never saw my steers and cows feed faster than they did under that system. Two years eight months' old steers were sold at £30, and the last sold, only two years and three months, went for £28. In conclusion, I cannot help expressing my opinion that there must ultimately be covered homesteads to aid in the production of meat; they tend to greatly economise food, to enrich the soil by the improved quality of the manure, which, at present, is but wetted and washed straw, surrounded by unspouted buildings. Attention must be paid, however, to their construction ; they should be lofty and well ventilated, open on the one end to the south-east, so that when the sun shines, the animals may benefit by its genial rays.

Many, I know, object to this system, fancying it will make the animals delicate, but it is my firm conviction that the old style of cow-houses went far further to try the constitution—places only 3 feet in width allowed for each animal, 6 or 8 feet in height, and no light or ventilation, save what comes through the chinks and crevices of a badly constructed door. What is likely to be the result when turned out to the yard, after having been confined in such a place all night ?

IMPORTATION OF SHEEP.

THE importation of sheep has received a good deal of attention of late, and some erroneous impressions have been made on the minds of many members of the House of Commons, and through them and the press these errors have been conveyed to the large seats of consumption throughout the kingdom. In reply to Mr Headlam on the 15th April last, Mr W. E. Forster, on behalf of the President of the Board of Trade, made use of the following facts, and the delusive suggestions which accompany them :—

> "Taking into consideration also the fact that the importation of sheep had very much diminished during the existence of the Order of August last, and that the price of mutton was rising, it was felt that the restriction ought no longer to be maintained. On comparing the importation of sheep from the 1st of September of last year up to the present date, compared with the same period from 1867, there had been a falling off of from 175,421 to 97,927. They were informed that that was owing to the restrictions, and the price of mutton was rising."

Now, it will be remembered, or, if a reference be made, it will be seen, that in your market notes for some months past, you were anticipating the present high price of both beef and mutton. You almost continuously, week by week, pointed out the large number of half-fed bullocks and sheep and lambs that were being crowded into the metropolitan, Manchester, Liverpool, and other large markets, because the drought of last year had reduced pastures and clover and grass fields to a condition of bare, parched soil. Turnips, mangold, and such crops as tares, mustard, and rape, were, as a rule, in nearly as bad a condition. As farmers were, besides, not in a position to keep their sheep and beasts on hay, straw, and orn, the large sacrifices which were made last autumn were unavoidable. It was, therefore, only one of the commonest deductions to conclude on this data that at about this time the rise in the value of beasts and sheep fit for the butcher would be considerable. "You cannot eat your cake and have it." The present dearness of meat is owing to the cheapness at which it was sold last autumn. In regard to the trade in foreign animals, one fact will of itself substantiate these views. For several years previous to last year one salesman of foreign stock had a train and packet-load of sheep, about 4000 in number, from Baden Baden per week. The supply was regularly kept up for about six months, beginning with the shearing season ; last year, however, this salesman did not receive a single sheep from Baden Baden, for the dealers in that country sent them to Paris, because mutton was dearer in Paris than in London. This we relate on the authority of a German salesman in London, who was thus deprived of his commission on 4000 sheep per week. This fact alone is a complete answer to Mr W. E. Forster's inferences and insinuations, that the present high price of mutton is due to the Privy Council restrictions of August last. As animals were killed off last year in a young and half-fat state, it is superfluous to say they cannot come to market now in a much heavier condition. Carcases of lamb last autumn were frequently cheaper in the market than any other meat. Thousands of lambs were sold to kill last autumn at from 5s. to 10s. per head. Two years before they would have been worth from 30s. to 45s. per head for keeping till the following spring and summer. All through last August and September, and down as late in the year as November, cook-shop and dining-room windows in the city of London, and in such leading streets as the Strand and Holborn, were placarded with "Lamb and Mint Sauce" as the leading dish to be had within. I noticed these signs at the time. On November 7 you said :—

> "The metropolitan stock and meat markets have been without much variation. As an indication of the excess of thin and the scarcity of well-fed meat, quotations vary from 2s. 8d. to 5s. 4d. per stone."

I have no objection whatever to the restoration of "free trade" in sheep, if it be clearly for the good of the country ; but in the face of the pending discussion on the traffic in home and foreign stock, I must take exception to the present dearness of mutton being placed on a false or unsound basis.—*W. W. G., in Agricultural Gazette.*

INQUIRY INTO PLEURO-PNEUMONIA IN CATTLE.

THE following is the final Report of the Directors of the Scottish Chamber of Agriculture, on the inquiry which has been instituted by them into the above disease :—

Aberdeen, 28th July 1868.

> "That, without committing itself to an opinion as to slaughtering all animals affected with pleuro-pneumonia, the Chamber appoint the Directors a committee to consider the whole question of legislation for the exclusion and limitation of contagious diseases, and to report to the next meeting of the Chamber."

In prosecution of the remit to them, the Directors prepared questions for the opinions of leading veterinary surgeons in the United Kingdom, as to the origin and nature of the disease, and sent these to Professors Simonds and Finlay Dun, veterinary surgeons for England; Professor Ferguson, for Ireland; Mr Edwards for Wales; Professors Williams and M'Call, for Scotland, and received full and anxiously prepared opinions in answer, and submitted a report thereon to the annual meeting of the Chamber in November last. At that meeting an amendment on this report was proposed by Messrs Goodlet and Barclay, and the matter was recommitted to the Directors for further consideration.

Since then various meetings and discussions have taken place on the subject; and at a meeting of the Counties Committee on 3d February last, other amendments were proposed and remitted to the Directors for consideration, and they have now agreed to adopt the following as their final report.

That a Consolidated Cattle Diseases, Traffic, and Transit Act of Parliament would, by providing increased security and protection from disease, and thereby decreasing the cost of producing meat, be of the greatest advantage, not only to the agricultural interest, but to the whole community.

That such Act of Parliament should contain the following requirements :—

1. That cattle, conveyed in any railway-truck, ship, or boat, for a period exceeding twelve hours, be provided with a supply of water before the expiry of that period, and at least once in every period of twelve hours thereafter, the period being reckoned from the time at which the cattle are delivered for conveyance by the owner to the carrier, until they reach their destination; and that the Privy Council be empowered to make such regulations as shall prevent unnecessary delays in the transit of animals by railway.

2. That cattle or sheep be only carried in ships or steamboats licensed for the purpose. That inspectors be appointed to prevent overcrowding. That the holds of ships or steamboats carrying cattle or sheep be properly ventilated; and that cattle or sheep be conveyed on railways only in covered trucks fitted with spring buffers.

3. The present system of shewing store cattle and dairy cows in the fat markets is one of the most fruitful causes of spreading infectious diseases of all kinds; and, therefore, in or near large towns where fat markets are held, there should be provided separate markets for *store* cattle, for *dairy cows*, and for *fat* cattle, so that none of these classes should come in contact with each other.

4. That foreign cattle should only be admitted into this country at ports specially sanctioned by order of the Privy Council.

5. That fat cattle from a foreign country should be excluded from every market save a licensed fat market, to be held at or near the port of debarkation, for the sale and slaughter of such foreign cattle, and that such markets should be under thorough Government supervision.

6. That foreign store cattle imported from a clean country, and which shall have been reported, on veterinary inspection, as clean before embarkation, and also on debarkation, and shall have been twenty-eight days in the possession of the importer on his own premises, near the landing, to which they shall be taken under license, and direct from the port of debarkation, may be shewn for sale in any store market or public sale in the kingdom; and, on these conditions being complied with, should have the same freedom of transit as is allowed to home store cattle.

7. That where, in the United Kingdom, pleuro-pneumonia exists, intimation shall be given by the owner to the local authority within three days of its occurrence, and the entire stock of the owner should be put under inspection, and isolated for a specified period, and disinfectants used under proper regulations; and that the removal alive of any infected animal from an infected place, or the wilful exposure in open market, or at a public sale, of any animal suffering from pleuro-pneumonia; or the knowingly taking such animals along the public highways, or conveying them by railway or boat, should be rendered an offence punishable in a summary manner by fine or imprisonment; but animals from an isolated place not suffering from such disease might be allowed to be removed for sale for immediate slaughter, under order of the local authority.

8. That, as regards the export trade of Ireland, the Order in Council by the Lord-Lieutenant, passed 6th March 1868, should be strictly enforced under the supervision of Government inspectors at each port of embarkation, and also at each port of debarkation in Great Britain.

9. That the inspectors of the local authority be authorized and required to see to the enforcement of the regulations prescribed by the Act or by the Privy Council, and be authorized to sue for the penalties, and that the penalties be applied towards the diminution of the local rate.

Farm Implements and Machines.

THE PLOUGH.

SECOND ARTICLE.

IN tracing the steps by which the plough has been brought to the state in which we now find it, we do not intend to take up space by giving what may be called purely antiquarian details; but we propose to begin with that period when the investigation of patient workers had modified the plough so as to give it all or nearly all the features which at this day a modern one presents. There is now lying before us a work in one sense altogether out of date, yet, in another sense, so far from being out of date, that we may very profitably look into its pages, and pick up from them something of considerable interest, if not of practical value. That work is intitled "The Plough-wright's Assistant; or a Practical Treatise on Various Implements Employed in Agriculture. By Andrew Gray. London and Edinburgh, 1808." The major portion of the volume is taken up with matter connected with the plough, and is profusely illustrated [illegible] diagrams. The first part of the work [illegible] the construction of the [illegible] Plough," and as this [illegible] practically suggest[illegible] resume of it. Fig. [illegible] represents a side elevation of the land side of the plough, with lines illustrating its action, to which we shall presently refer. The active parts of a plough are the "sock" or "share," the "coulter," and the "mould-board," and as these all influence the form of the furrow-slice, which is cut from the soil, and the portion which it occupies when finally laid over, it is in the perfecting of the form of these parts, that we find the greatest attention has been paid by the agricultural mechanic. Let us first take up the consideration of the "mould-board." Many conjectures have been offered as to the origin of this part of the plough, and various attempts made to discover the name and date of the inventor and the invention. But of either we have no real fact recorded; like the potter's wheel, it has descended to us through a long long course of years, but has brought with it no memorial of him to whom it owed its invention—if indeed it originated with any one individual, and was not rather the result of a long carried on series of improvements upon a happily conceived and original idea.

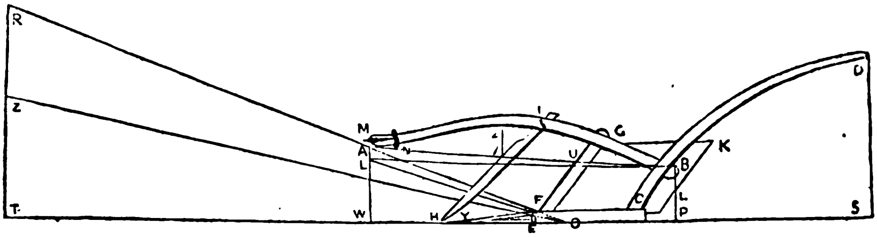


Fig. 1.

Fig. 2 represents the piece of wood out of which the mould-board or its pattern is to be formed. This should be of such dimensions every way, that the desired "twist" should be included in it. By cutting off the corners, *a g c* and *b d h*, then the outline, *a b c d*, will represent the elevation of the land side of the mould-board, and *e f* the wrest or lower side, placed along its lower edge. When *a b c d* is joined to the body, it will stand in the angle *i r*, fig. 3, with relation to the line *a b*, which is the line of the land side of the head or sole of the plough. In fig. 3, the rectangle, *i k l m*, will be the lower edge, and *p r o t*, its upper edge; the angle, 1 2 o, being cut off to a perpendicular face, which will be joined close to the furrow side of the sheath, *e g*, fig. 1, one end of which is tenoned into the beam, the other into the sole, from the point *i* to *o*.

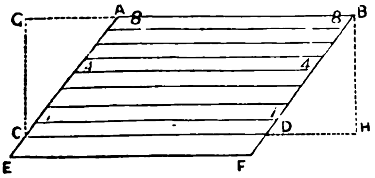


Fig. 2.

The point, *c*, of the piece of wood in fig. 2 must be placed on the point *f*, in fig. 3, and the inside fitted to the lower part of the smaller handle. If the mould, *p r*, fig. 3, be drawn on the upper edge of this piece of the wood, and 1 *m*, on the lower edge, in the proper angles or positions to each other, and the angle, *p g k*, cut or hollowed out, then the furrow side of the mould-board will be formed in the regular "twist" from one end to the other. The cutting out of the part *p g k* must be done between the draughts from the lower to the upper edge of the wood, straight along the furrow side, from the end *r m* to the end *i o*, in the direction of the parallel horizontal lines *a b c d*, in fig. 2. These points are equally divided, as 1 4 8, on the lines *i o* and *r m*, in fig. 3; these lines being drawn in their proper position, the end, *i o*, being at an equal angle with the edge of the sheath, *e g*, fig. 1. According to the position of the sheath, *e g*, fig. 1, and the front edge, *i o*, of the mould-board, fig. 3, the furrow-slice will be turned over gradually or quickly. If the fore-edge, for example, of the sheath, *e g*, fig. 1, be set nearly upright, and, by consequence, the front-edge of the mould-board, *i o*, fig. 3, the furrow slice in rising up from the hind part of the sock, *i o*, fig. 1, will soon be resisted by the sheath, *e g*, fig. 1, and the fore part of the mould-board, *i o*, fig. 3, and it will be turned over suddenly. But the case will be altered, and the furrow-slice will be sufficiently raised up on the fore-end of the mould-board before it is turned over, if the edge of the sheath makes an angle—say, of 35 degrees, with the lower side of the head or sole *o*, fig. 1 The furrow side of the wrest, or lower side of the mould-board, as *i g*, fig. 3, is usually placed to form an angle of 16 degrees to 20 degrees, with the line *a b*, of the land side of the plough, at the same time that the upper edge, *o r*, of the mould-board forms an angle of between 34 degrees and 38 degrees, with the level side of the plough. There is, then, a difference of 18 degrees between these angles, dividing the breadth of the mould-board in 18 equal parts or degrees, giving to the lower edge or first part 18 degrees, 18 degrees to the second, 19 to the third, 20, and so on, till the upper edge of the mould-board is reached.

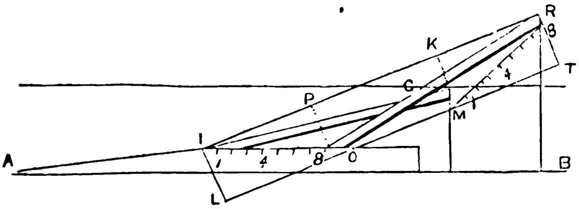


Fig. 3

Following these details strictly out, the contour or twist of the mould-board will be such that it will recede gradually and equally from the land side of the plough. And by making the angle of the back edge or end equal to that of the fore end or edge, and thus making the mould-board of equal length at top and bottom, the furrow side being equally twisted, will regularly and gradually turn over the furrow-slice as the plough advances in the soil. It follows, therefore, that whatever difference there is between the angle of the lower and upper edges of the mould-board, there will be a corresponding difference between the twist or contour; so that by varying these, any decided position of the furrow-slice may be obtained. We shall go more fully into this when illustrating other forms of plough. In the older form of the Scotch plough, the mould-board used was simply a straight-sided wedge without twist, or rather a half wedge or inclined plane moving forward on its edge in the cut made by the coulter, the base of the wedge being pressed close to the land. When the mere turning of the slice was all that was deemed necessary, this straight-sided wedge mould-board performed its office well enough; but where it was deemed necessary to completely invert the slice, exposing a surface which had formerly been hidden, and burying the uppermost surface, a different form of mould-board with twist was necessary, such as we have described. In fig. 4, we give a diagram illustrating the wedges used in the old Scotch plough, in which *a b c d* represent a triangular block of wood, the back edge, *a b*, of which is perpendicular; the lower edge of *a b* ; lies in the angle, one side of which is formed by the land side of the plough, and the lower side of the wedge, the base of which forms a triangle *b c d*—square at *a*, and acute at *l*; the breadth *b c* is equal to the breadth of the lower part of the plough behind. Cutting through the block at the height, and in the direction of the line *i k*, the lower part forms a wedge, with *i k l* for its upper, and *b c d* for its lower side. Drawing the block in the direction *c d*, its back surface being in close contact with the land, the front surface *l k c l* will move the furrow to the side, and raise t; but will not turn it over, being straight-sided. To turn over the slice requires the mould-board to have a twist, as already described.

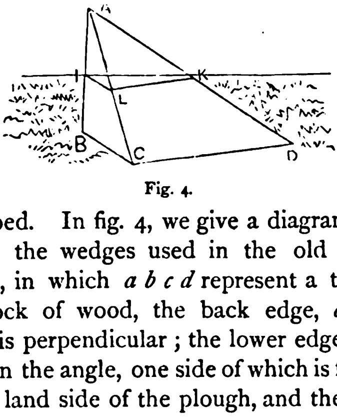


Fig. 4.

We now take up the points connected with the "sock" or "slice," the other member carried by the body of the plough. In fig. 5, *a c d* represents the sock fixed in the fore end of the sole, *a b*. The sock is so placed that the point *c* is directed a little to the furrow side, *d f*, of the sole. This sock or share, as will be observed, has no feather in the furrow side. The position named above is the best for this form of stock, for if its land, *a c*, were in a line with the land side, *a b*, of the sole, the point, being then too much to the left hand, would not raise the soil properly. The position of the point of the share determines the hold it takes of the soil: if pointed downwards, the sock will take more, if upwards, less earth. In fig. 5, *d e* is the lower edge of the mould-board, fastened to the sole at *d*, and at an angle, so that its furrow side, *d e*, makes an angle of 16 deg. to 20 deg. with the land side, *a b*, of the sole. In fig. 6 we give another or side view of the share, in which *i h* is the lower side of the sole, *g l i* the share fixed on the point, with the side, *g i*, placed on a line with the line *i h* of the lower edge of the sole, which is the best position, resistance being given to it in its passage through the soil, this rising easily on the upper side. But if the sock or share was placed with its point in the direction of the line *i k*, the resistance on its upper side would not only be increased, but that on the lower side would be much greater. Since, because *k* is higher than *i*, the furrow is not opened to its full depth by the point, *k*, of the share; the result is, that

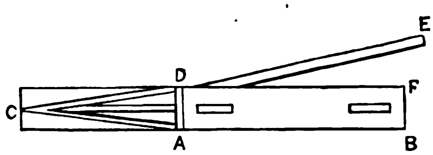


Fig. 5.

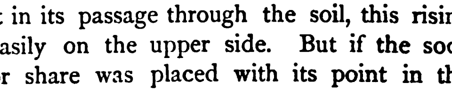


Fig. 6.

the furrow would be made deeper and deeper by the under side *i k*, as the plough advances, adding materially to the labour of working it.

Let us now turn to the next member of the plough—namely, the "coulter," *h i* (fig. 1). This is placed in a sloping position, so that it forms an angle of 45 degrees with the under side, *g i h*, of the sole (fig. 6). We shall see, as we advance in our investigation into the modern plough, that the mere angle of the coulter does not influence the draught of the plough so much as one would suppose at the first consideration. The point of the coulter is placed a little before and above the point of the share. The plane or surface of the land side of the coulter is placed so that it coincides with, or is in a line with, the plane of the land side of the body of the plough. For, if this is not attended to, and the land side of the coulter was twisted round, so to say, till it was out of the plane of the body of the plough, and lying towards the land side or left, then the resistance it meets with from the opposite side makes the plough swerve on the land side. On the contrary, if the plane of the land side of the coulter is turned round so as to cut the plane of the body forwards, then the resistance which the coulter then meets with tends to make the plough swerve towards the furrow side. The position, then, of the coulter influences the work of the plough — the land side of the coulter is flat, and the furrow side curved; the flat side, as above described, being coincident with the land side of the body of the plough, so that the coulter cuts the land in a direction parallel to the line of draught.

We now come to the beam which carries the coulter, and is connected to the body of the plough, made up in the old plough now under consideration of the sole or head, *o*, the sheath, *f v*, and the stilt or handle, *c d* (fig 1.), which is a side elevation of the left hand or land side of the old Scotch plough. The beam is at *a b*, fixed at one end, *b*, to the large handle, *c d*, the rise of the upper end of which, from line *p s* to *d*, is 38 inches. The point, *b*, is on the perpendicular line *p b*, 12 inches from *p*. The height, *a*, of the end of the beam depends upon the line of draught, the number of horses employed to drag the plough, and the way in which they are yoked. Thus, to determine the position of the beams when there are two horses yoked abreast, extend the line *p e* to *t*, so that the distance from *p* to *t* be 13 feet, thereby allowing 6 feet for the length of the beam, and 7 feet for the distance from the line *w m*, the end of the beam; raise the perpendicular *t r*, which should be about 4 feet 6 inches from *t* to *r*, the horses' shoulders, or supposed point of draught; then determine as exactly as possible what point in the line, *e p*, is the centre of gravity of the plough, which, when finished, will in general be found to be near the point, *o*, behind the sheath; join *r* to *o*; bring the end of the beam *a* to touch the line of draught, *o r*, and this will be found the true position of the beam when two horses are employed yoked abreast. Again, when the beam is placed in this manner, the perpendicular from *w* to *a* will be found to be about 18 inches; so that, if a rule be laid along the lower side, *p e*, of the head, and extended forward to *w*, the beam, being so placed as to make the distance from the point *a* to the rule at *w* about 18 inches, will thus also be found in its proper position when two horses are in the plough yoked abreast.

To determine the position of the beam when there are four horses in the plough, yoked two and two a-breast: if the line, *p e*, is extended 9 feet forward from *t*—that is, 16 feet from the end of the beam *o*, which is allowing 9 feet for the distance of the shoulders of the first two horses from the shoulders of the last two—then, as *m r*, the draught line of the last two horses, makes an angle of about 24 deg. with, *p e*, the lower side of the head, the draught line, *o z*, of the two first horses will make an angle of about 14 deg. with *p e*. Two forces are now applied to the plough in different directions, the one in the line *o r*, and the other in the line *o z*. Bisect or divide the angle, *o r z*, by the line *o l*, which is the direction of the two forces united, consequently the line of draught. Bring the point, *a*, of the beam to touch the line, *o l*, which is the proper position of the beam, either when two horses are yoked, the one before the other, or when four horses are in the plough yoked two and two abreast. Let us suppose that the end of the beam cuts the line, *l o* at *l*, then the beam is in the position, *b l*, and the perpendicular, *l w*, about 16 inches in height. The true position of the beam may be found in the same manner, whatever number of cattle are in the plough, and whichever way yoked.

The beam is curved, as shewn at *v*. The height of this curve from the line, *n i b*, is about 5 inches from 1 to 2. ' This curve is given in order to enable the weeds, grass, &c., to be easily cleared from the beam and the upper end of the coulter. The curve of 5 inches was found to be the best for easing the plough in this way, without over-weakening the beam. The yoking of the horses also influenced the position of the beam; for by placing them at a great distance from the plough, or the traces lower on their shoulders, and lengthening their back-bands, the line of draught will be brought nearer a horizontal position, and the plough forced deeper into the ground. But by shortening the distance behind the horses and the plough, raising the traces on their shoulders, and shortening their back-bands, the line of draught will be taken further out of the horizontal position, and the plough will rise out of the ground. In fig. 1, *e g* is the sheath, fixed into the beam at *v*, and the sole, or head, at *f*, and at an angle of 35 deg., or thereabouts, with the lower side, *p e*, of the sole. By this arrangement, the distance between the coulter and the share was greater below than above, allowing sufficient space for the length of the share between the point *h*, of the coulter and the sheath at *f*; the share is also allowed to have a long taper, enabling it to enter in below the furrow slice, and raise it gradually and unbroken, before it is turned over by the

mould-board. The beam is furnished with the bridle or muzzle *m n*, but a contrivance is almost precisely similar t in use now, we pass on to give, in fig. 7, a plan of this " old Scotch plough " com in which *a b* is the large handle fixed beam at *c*, and its lower end well fastene the head at *d*. The left side of the p *b c*, being in one plane, it will meet wit resistance from the firm ground on th when the plough is going straight forwa the lesser handle, fastened to the large the bars, *i m n*, that pass between them; the mould-board ; the fore end, *i g*, is fa to the furrow side of the sheath, and it end to the lesser handle. The land the plough being all in the same plan the mould-board receding gradually fro plane (see fig. 1), the upper part of the board at *h* is at a greater distance fr plane of the land side, *b c*, than *l*, the or *k*, its lower edge. It is this casting the mould-board that turns over the e the furrow; and the mould-board ma such a cast outwards above, as either t the furrow slice on its edge, or turn i over on its back, or leave it in any intermediate position that may be required

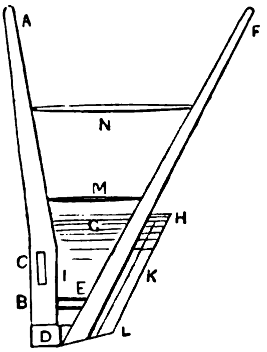


Fig. 7.

Notes and Queries.

III. IRON ROOFS FOR FARM BUILDINGS.

have been urged to give a design for a roof adapted for a covered-in steading, with which ed iron or zinc might be used as a roof material in place of slate or tiles. In fig. 1, *e g*, *m m*, the skeleton of a truss or a roof of 54 to 60 These trusses are placed at intervals of to 15 feet in the walls, or supported upon ars, which are represented by the vertical w, *a b c d*. The trusses support the galvanized iron or zinc plates, which will be all the stronger if curved in the direction of their cross section, as in *a b c d* in the lower part of fig. 1. In fig. 2 we give, to the scale of eighth part full size, the detail of shoe junction of rafters at the apex of truss in fig. 1. The rafters are at *a a*, and are passed into recesses, *c*, made in the side of the shoe *b*. The shoe is provided with a snug finished off with an eye, *c*, to which the end of the vertical tie rod stretching from *f* to *h*, fig. 1, if jointed. In fig. 2, *d* shews the plan of under side of shoe, and *e* the side elevation of ditto. In fig. 3 we give

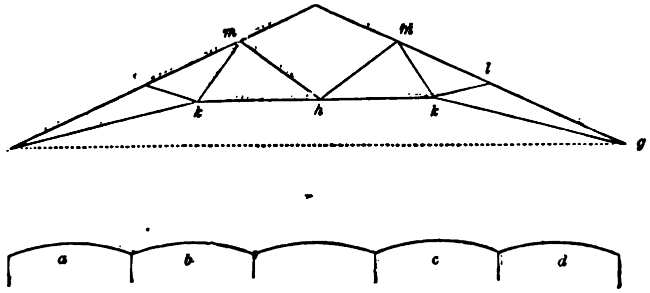


Fig. 1.

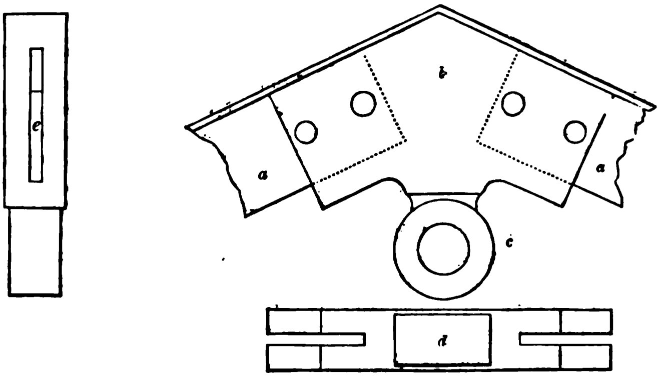


Fig. 2.

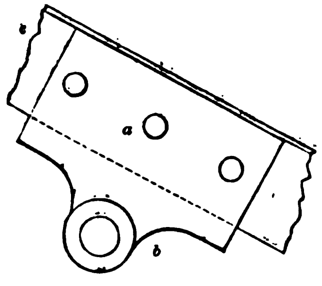


Fig. 3.

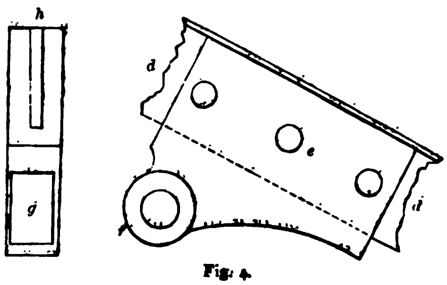


Fig. 4.

the cast-iron shoe to which the ends, *l l*, of the ties, *k l k l*, fig. 1, are joined at the eye *b*; *a* the shoe rivetted on the wrought-iron rafter *c c*. In fig. 4 we give the form of cast-iron shoe to which the ends, *m m*, of rods, *m h m h*, fig. 1, are jointed to the eye *f*, *g d d* the rafters, *e* the shoe rivetted to *a*; *g h* is a side view. In fig 5 we give the form of shoe in which the lower end, *g h*, of vertical tie rod, *h i*, fig. 1, is jointed; *b b* horizontal tie, *a* shoe, *c* the eye to which the rod is jointed; *d e e f* is side view of same. In fig. 6 we give the shoe to which the lower terminations *k k* of the rods *k l* (fig. 1) are attached.

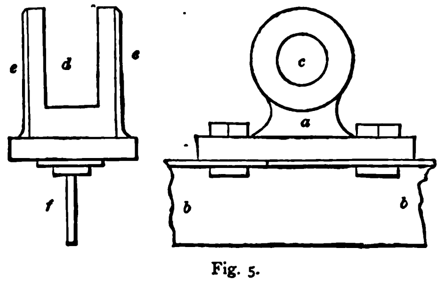


Fig. 5.

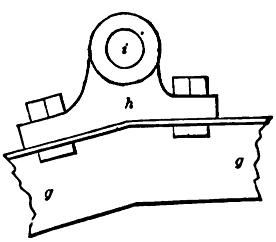


Fig. 6.

XXXIV. HEATH-FOWL.

A *Constant Reader* would feel obliged if you or any of your readers would favour her with further information regarding the domesticated heath-fowl than is contained in the following extract from "Agricultural Account of Dumbartonshire," in "The Beauties of Scotland," 1806, vol. iii. p. 348:—"A variety of the dung-hill fowl has sometimes been found in the mosses, and domesticated by taking the eggs from the wild bird's nest, and taking care to have them hatched and reared by a common hen. This variety is called the *heath-fowl*, and is but rarely found either here or in the northern counties of Scotland [illegible] not so large as the common dung-hill [illegible] eggs. [illegible] are equally [illegible] The hen [illegible] and seldom [illegible] hatched by [illegible] hen, [illegible] the shell [illegible] chipped [illegible] frequently so hard that the young chick cannot [illegible] it so as to disengage itself. The colour of the chick very much resembles that of a partridge; but in fowls come to maturity the colour is commonly red or brown, mixed with spots of white and grey. Both cocks and hens are round-crested, and often the crests are so large that they hang over the eyes, and must frequently be clipped. They are smooth-legged, and the length of the leg is in proportion to the body. The heels of the cock are short, and not very well adapted for fighting; both cocks and hens, however, fight keenly with the bill, which is thick, short, and hooked. Although they are fully domesticated, yet they are fond of swamps and woods, and are extremely greedy of worms and other reptiles, in quest of which they wander to a considerable distance. They will frequently leave their companions of the dung-hill, and, in search of worms, &c., follow any plough that may be going in the neighbourhood. They are more easily supported than common fowls, and their eggs bring nearly double the price of ordinary eggs."

XXXV. LIME-DRESSING FOR POTATOES.

Last year I drained (4 feet deep), and cleared from whins, stones, and other rubbish, some land which I am now cross ploughing, with the intention of planting with potatoes, and knowing the partiality of this tuber for lime, I shall feel obliged if you will inform me whether or not this year's crop would derive as much benefit from lime if applied now, as if applied last autumn, or any other time of the year? I think of applying ten cartloads per acre, which I would lay down in small heaps, spreading with the shovel, and then harrowing in.—*H. S.*

XXXVI. POTATO PLANTING.

From the results of experiments on this subject, made by Mr James Thomson, Nether Hall, Maryport, there are several conclusions we might come to: (1.) That it is a dead loss to plant saleable whole potatoes, as in Nos. 1, 5, 9, and 13 to 17 and 19 to 21, for although the average of Nos. 1, 5 and 9 is more than that of the others, still there is double the weight planted, and being saleable potatoes, would bring a great deal more in the market. (2.) It is also a loss to cut up saleable potatoes for seed, as in Nos. 2, 6 and 10 as they might be sold for a much larger price than the sma[illegible] although the result is less than any of the others, as there are fewer small, but they had a very bad chance as they were hoed when the weather was very hot and in pulling the tops it loosened the soil and let the drought more into them than it got into the others. "The result of Nos. 17 and 18," says Mr Thomson, "is very unsatisfactory, but in trying the same experiment again I would have the same ones, while the small ones, Nos. 3, 7 and 11, have the largest average.

	Marketable Potatoes. st.	Marketable Potatoes. lb.	Small st.	Small lb.
Average of Nos. 1, 5 and 9	5	13⅔	1	6
,, ,, 2, 6 and 10	4	9	1	0
,, ,, 3, 7 and 11	5	4⅓	1	1
,, ,, 4, 8 and 12	4	4	0	7

(3.) Then again, pulling the tops when hoed, as in os. 4, 8 and 12, is believed to be a good plan, umber of sets in each lot, and in cutting them nly halve them down the centre. Other 14 sets ı 86 feet would have made a great difference. I rould like to see a few farmers in various parts of he country try the same experiment to see what the esult would be; but they would need all to work to a iven plan, planting the same kind of potatoes, the ame number on the same length of drill, &c., or if they were to plant different kinds it would be more variation and the result would be the same. I think of repeating the experiment this year, when I will have the number of sets in each lot as nearly equal as it is possible to get them, so that the weights and distance apart in the drill will be nearly the same. For instance, if there had been the same number of sets in Nos. 13 and 14 I believe the produce would have been about equal."

EXPERIMENTS WITH POTATOES ON NETHER HALL FARM, MARYPORT, CUMBERLAND.

Nos.	Names of kinds.	Weight planted.	Number of Sets.	Average weight.	Drill.	Marketable Potatoes.		Small Potatoes.		Where seed was grown.
		lb.		oz.		st.	lb.	st.	lb.	
1	Walker's Regent, large, whole.	14	47	4¾	86 ft.	6	12	1	4	Fifeshire.
2	Do., cut in the ordinary way..	7	69	1½ The fractions below ¼ of an oz. are left out.	...	5	7	1	0	
3	Do., small, whole	7	68	1½	...	6	0	0	13	
4	Do., small, whole, tops pulled	7	68	1½	...	4	4	0	8	
5	Rough whites,[1] large, whole	14	47	4¾	...	3	11	1	6	Grown upon the farm.
6	Do., cut	7	70	1½	... 28 inches between drills.	2	11	1	0	
7	Do., small, whole	7	67	1½	...	3	13	1	1	
8	Do., small, tops pulled.........	7	67	1½	...	3	11	0	7	
9	Dalmahoys, large, whole	14	47	4¾	...	7	4	1	10	Fifeshire.
10	Do., cut	7	67	1½	...	5	9	1	1	
11	Do., small, whole	7	77	1½	...	6	0	1	3	
12	Do., small, tops pulled.........	7	77	1½	...	4	11	0	7	
13	Pitkinnie blue[2]	14	86	3¾	...	7	2	1	7	Pitkinnie, Fifeshire.
14	Early blue	14	69	3¼	...	6	1	1	4	Craigkelly, Fifeshire.
15	Snowball, two drills,[3]	14	134	1½	...	7	0	2	7	Berkshire.
16	Hybridized Fluke[4]	14	63	3½	...	3	11	0	8	Lancashire.
17	Common Fluke[5]	14	62	3½	...	4	4	1	4	Grown upon the farm.
18	Do., cut	7	48	2¼	...	2	12	1	4	
19	Rocks	14	62	3½	...	6	8	1	11	Near Silloth.
20	Skerry Blue	14	80	2¾	...	4	8	1	11	Berkshire.
21	Waterloo[6]	14	67	3¼	...	7	9	1	6	Near Silloth.
		224				110	8	25	10	

The ground was all manured alike with farm-yard manure; it was put on the stubble in the autumn, and ploughed in. All the kinds were planted on the 1st of April, and lifted on the 1st of September. No disease in any of the lots. When hoed the first time, all the tops of Nos. 4, 8, and 12 were pulled, except the strongest stem.

[1] I believe Rough Whites to be a local name for American Earlies.

[2] These two Blues look very like the same potato both in growth and tuber; the difference in weight lifted may be accounted for by the difference of the number of sets planted.

[3] More adapted for gardens than field culture.

[4] Coloured pink and white, and from ten days to a fortnight earlier than the Common fluke.

[5] A good part of the difference between the whole and the cut in Nos. 17 and 18 may be accounted for by the difference in the number of sets.

[6] A round red potato, something the colour of Orkney red, but rounder shaped and rougher in the skin. I believe it is the same potato that they call Red Regent in Warwickshire and farther south.

XXXVII. RETENTION OF MOISTURE IN ARABLE LAND.

In the Nos. of this Magazine for February and March we gave two papers under this title. The following note may be taken as an appendix on the matter there given:—Of the effects of the great heat and drought of the memorable summer of 1826, Mr Headrick of Dunichen, on the 1st of August, thus reported of the central district of Forfarshire:—"The thermometer has varied from 70 deg. to 85 deg., and sometimes 90 deg. in the shade. The harvest generally commenced on the 20th July, and the oats and barley are so short that they cannot be cut by the hook, but must be pulled by the hand. A great proportion of them will hardly yield more than double the seed, and three seeds may be expected from the best crops. Wheat is generally a full average crop of sound grain. On some dry sandy soils it assumed a livid blue colour, which changed to a sickly white, shewing that it had withered without filling. All the crops are best on wet and boggy grounds, where, in wet seasons, they would have been of little value. The rains of the 20th and 21st, though pretty copious, did not nearly saturate the thirsty earth. The heat soon returned, and the rain has made little sensible improvement on the appearance of the pastures, nor did the rain get to the roots of the potatoes, which are not half a crop, and the dung below them is like hardened pieces of dried peat. Turnip seeds, which were supposed to have lost their vegetative power owing to their long exposure to the intense heat of the sun, germinated with the recent rains. Some cattle have died of starvation, and many others are like walking skeletons, devouring every plant of grass that comes within their reach. How the cattle are to subsist through next winter, exceeds comprehension. The subsistence of the people is a more serious consideration, for it does not appear that this crop, at the ordinary rate of consumption, will be sufficient to support them above six months."

XXXVIII. NUMBER OF CATTLE, SHEEP, AND PIGS, CONVEYED BY RAIL IN EACH DIVISION OF THE UNITED KINGDOM IN THE YEAR 1867.

In reply to *T. S.*, *York*, we give the following statistics of live stock conveyed by railway, as prepared by Mr A. W. Fonblanque, of the Statistical Department of the Board of Trade :—

	Cattle.	Sheep.	Pigs.
Engld. & Wales.	2,310,368	7,171,412	1,389,582
Scotland..........	460,842	1,813,594	83,067
Ireland............	698,438	724,121	1,072,634
Total.....	3,469,648	9,709,127	2,545,283

XXXIX. THE ECONOMIZATION OF FEEDING-STUFFS.

From a variety of sources we have thrown together the following notes upon this important subject. Opinion seems pretty equally divided upon one subject —namely, the cooking of cattle food. Upon the whole, evidence, we think, is more favourable to a portion of the food being cooked than to the whole of it. Thus, the experiments of Colonel M'Donald of Logan, shewed, amongst other things, that one feed of cooked food per day, with two feeds of raw swedes, returned the most profit—more so than three feeds of raw swedes; but when two feeds of cooked food were given, and only one feed of raw swedes, there was a loss. The food consumed daily by each animal when two feeds of turnips and one feed of cooked food were given, was as follows:—84 lb. of swedes and one feed of cooked food at noon, consisting of 3 lb. cut straw, boiled along with 3 lb. of bean meal; the latter, the bean meal, being increased towards the conclusion of the experiment to 5 lb. daily. The same kind of cooked food was given to the lot, which was allowed two prepared feeds per day, but in this case the daily quantity of turnips consumed by each beast amounted only to 42 lb." The following on this point is from an able paper, lately read before one of our societies :—"As to the economy of cooking roots, I think we may look to practice for an answer. No doubt, it renders the food somewhat more easy of digestion, but when we see so many an apparatus which was once to do wonders, left, after the first year or two, to rust, I think we may presume that the benefit is not considered equal to the trouble and expense. To prevent waste of the quantity of the crop, roots should be cut up. I don't like pulping; it is done at a greater cost of labour, with no other result, that I can see, than that it makes a greater mess of the food. To prevent waste in the quality of the crop, roots must be used before nature robs them of their goodness. There remains only that portion of the cereal crop which we can consume upon the farm, in conjunction with cake and other artificial food. It is useless for me to attempt to lay down a general rule as to the best mixture, or the proper quantities to be used. The market prices, and the quality of the material, must be our guide. At the same time, it is the care in proportioning this part of our forage which will mainly decide the question for us, whether it has paid us to feed at all. There is, I am sure, great waste in this respect. A majority may almost always be found at a farmer's meeting to own that feeding beef, at present prices, won't pay; and the excuse given to the world for the apparent insanity we are all guilty of in feeding beef for other people when it does not pay us is, that we have our profit in the increased value of the manure. How do we know this? A thorough chemist might ascertain whether all he sacrificed in the beef was present in the manure, but no farmer knows this. He knows, as a general rule, that good feeding makes good manure; but he does not know how wasteful feeding will look upon the scales. A very much smaller quantity than is usually used of corn and cake of good quality, well mixed and proportioned with our other forage, will produce quite as much, and much better, beef; and if the manure has not then so much corn and cake in it as when double the quantity is consumed by the animal, we can add it ourselves to the manure-heap, and we then know the exact cost of our wisdom or our folly without troubling a poor ox to pass it through him. The great rule in feeding cattle or sheep is the same as that recommended for ourselves by practical medical men—they should always finish a meal with an appetite. Like us, cattle vary very much; some are coarser feeders than others, some like one thing better than another; and these whims and fancies of their appetite must be attended to. Another point is, they must be undisturbed; they must know, as they soon learn by habit, when their food will be given to them, and they must not be disappointed. Nothing can beat the system I used to see in Norfolk. The cattle, whether in loose boxes or tied up, or in open yards, were fed as regularly as clockwork four times a-day, and each meal was divided into at least two courses—the man taking to each a feed of roots cut up and well mixed with hay and straw chaff, and when they had quite finished that, a feed of meal, cake, and chaff was supplied them. If any course in any meal was not licked up clean by any beast, what was left was at once removed, and less given the next time, or, if thought necessary, a change made in his diet. Under this system the cattle all lay down as soon as they had finished their second course, and did not stir till they again saw their friend. Each beast was thus carefully watched and humoured. With sheep the same care and attention will be amply repaid, but to watch them properly requires the practical eye of the regular shepherd—a very rare person to find on this side of England, where the dairy is the principle class of farming. A farmer may, however, be sure that if he has food in any rack, manger, or feeding-trough, and an animal not then and there eating it, his forage is being wasted, and the appetite of his stock injured."

At all times waste is a woful thing, and if it doe not actually, it is well calculated to bring with it the woful want, of which the proverb speaks. But at all times it is doubly so in times of positive or comparative scarcity, when prices rule high and supplies low. It is, therefore, a good thing to know how to make the best of things, and, in the spirit of true economy, to administer, as well as to save wisely. There can be no doubt that a vast deal of good food is thrown away, not only by wasteful ways of preparing it, but by injudicious modes of administering it. In the various papers which have been read before the leading Societies and Farmer's Clubs, we have abundant sources from which to draw a number of "retrospective notes" on the subject indicated by our title; but from the perusal of sundry papers read before American societies—and for which we are indebted to one of the representives of the American Government in this country—we are induced to think that we can draw from them much information which, while it is essentially practical, will have the additional recommendation of coming from sources which are not usually within the reach of readers in this country. We get into the very heart of the subject through what passed from a speaker at one of the State Agricultural Societies, who said in effect, and said most suggestively, that feeding is an important branch of raising and rearing stock, but that it was not so easy apparently to know how to feed. A farmer may fill his barns with food, but not one in a hundred knows how to *feed out that food to a profit*, and that not one in five hundred know how to feed out his crops so that he can receive the market price for them. Another speaker remarked at the same meeting, that he believed that in his State from 10 to 15 per cent. of the food given, or rather supposed to be given, is thrown absolutely away. Another speaker went somewhat more elaborately into the subject; said that the business of feeding animals is not an easy thing; that it is not every man who knows how to feed an animal, no matter how thrifty he may be. One will take any number of cattle and make money on them; another the same number, but will only "realise a loss." The subject being thus fairly opened up, several speakers gave the meeting their notions of the subject and the result of their experience, some of the points of which we now present to our readers. One gentleman, who, it appears, has a high reputation as a feeder, and has made some elaborate experiments in feeding with steamed food, gave some details which are interesting and suggestive. All the fooder he cuts and steams, feeding the animals twice a-day with the steamed food, and giving them dry hay in the middle of the day. Everything which he happens to have in the way of coarse fodder he cuts up and mixes with good hay, and good rye or bran. The proportions are somewhere about one-half hay and one-half coarse fodder, with a comparatively small portion of bran or rye. The whole is put into the steaming-box, the dimensions of which are 6 feet square and7 feet deep. The food, when steamed, is given to the cattle warm This farmer is a great advocate for house-feeding in cold weather; the importance of keeping the animals warm he considers very great; he does not even turn them out for exercise during very cold weather, for he says that if you turn out a cow in a cold day, she will not move about, but keep standing still in the same spot. The food is steamed twice a-week. About 1400 lb. of good hay, Indian corn stalks, and rye straw are put into the steaming-box, together with 100 lb. of wheat bran. That feeds, he continued, all my stock twice a-day for three days and a-half. I have forty-two cows and animals that are over one year old, six horses, and ten head of cattle younger than that. They are all fed out of the steam-box, the horses getting a little in addition—bran when they are not at work, meal when they are at work. I find that young colts eat it eagerly. In the middle of the day they have about 150 lb. of hay, so that about 500 lb. of good hay, and 1400 lb. of steamed fodder last that whole stock three days and a-half. In putting the fodder into the box, I intend to put in just as much water as I can make is carry, the object being to make it absorb as much water as possible, and reduce the mass to as soft pulpy state as possible. Of course my apparatus does not admit of much pressure, and I boil as long as possible. In reply to a gentleman who asked, Do you not lose a good deal of the water which has been mixed with the food? the speaker replied—Not much. Sometimes there is a little leaks out, and I have arranged to save that. I do not allow that to go to waste. Whatever is not eaten is collected and thrown in again. Sometimes, for a cow that is fresh in milk, I throw in a little oatmeal; but I usually intend to feed my milch cows upon half a bushel of mangold wurtzels each a-day. Another speaker stated that he had tried steaming himself a good deal; and he agreed with the last speaker, except in one particular, on which he does not seem to have dwelt—and that is, the expediency of steaming good hay. I have not, he says, found that it improved the quality or nutritive properties of English hay—the best hay—to subject it to the process of steaming; I have thought it injured it; but corn fodder, coarse straw, coarse meadow hay, everything of that description, is undoubtedly brought into a better condition, as nutritive substances, by cooking than without; I have no doubt of it all. Another gentleman followed with a description of his method. In the first place, he said, I have two hay-cutters of good size (and I would not recommend any man to buy a small one), and I cut all my fodder, corn stalks, meadow hay, straw, and everything that I intend to use for feed, several tons at a time. My barn is tight, and it is thrown on the floor, or on a mow, where it is sprinked over with water; a little alt is added, and it is suffered to remain there two, three, or four days, until the whole mass is moist. Then it is overhauled, mixed thoroughly, and any grain which I have to use is mixed up with it. It is suffered to lie twenty-four hours, and then given to the cattle. I have tried that experiment in contrast with the experiment of feeding long hay and long fodder and mixing English hay and the poor qualities; and without any accurate experiments, such as weighing or measuring (which I have not gone into, except in one instance, where I weighed the food given to my horses), it seems to me that even that cheap and simple process saves about one quarter of the fodder; and the cattle appear better even than they would if the other kind of food was fed out. I have been through that experiment so many times, that I have come to the conclusion that that is the result of that process. I was led to try it by the difficulty of getting hay. Fearing that I should run short one winter, I went to one of my neighbours to purchase some, and he asked such an exorbitant price that I ordered a ton of oats, and had them ground together, and sent up to me. I then took all my fodder and mixed this meal with it; and, instead of falling short of hay, I had a ton or two left after carrying my stock through completely, and they never did better. I have no doubt that I saved by that operation, after the commencement of the month of February, two or three tons of good hay. We can all do that. We can all purchase a hay cutter, and can occupy the stormy days of the winter in cutting up the fodder, and carry through our stock for twenty-five per cent. less than in the ordinary way. Professor Agassiz, who took part in the discussion, asked a gentleman whether, instead of giving their cattle water, he did not sometimes give them a warm infusion of hay as a beverage? "We do not," says the professor, "always drink clear water when we are thirsty, but occasionally take a glass of wine, when we like it, or approve of it, or we take tea; and that tea helps the constitution, acts as a tonic on the digestion; and I suppose that kind of tea given to cows, instead of clear water, would improve n too." In reply, the gentleman stated that he raised all his calves on hay tea. "The calves are off after they have sucked two or three times, anc make butter all the time, summer and winte calves are fed with skimmed milk (what there spare), mixed very largely with tea made of E hay, just as some old women make tea in the pot. At first, perhaps, there is a pint of milk from the cow, put in with the hay tea, and the teaches the calves to suck by putting his finge their months; but it is not necessary to do it than two or three times. They will take the te well. I have calves now which are living upo made of English hay, and have had nothing else they were four or five weeks old, and they thri cellently upon it." On the system of *s* as against the steaming of food, the foll are the remarks of another speaker:—"I hav neighbour who, I think, feeds his cattle full cent. cheaper than his other neighbours. astonished at the small quantity of food with wl carried his cattle through, getting the usual qu of milk and keeping his cattle in good con He adapted the practice of mixing up his Englis meadow hay, corn stalks, shorts, or meal, what was, and soaking them. Now, common sense t us that an animal, in order to thrive, must ha same amount of nourishment to produce a giv sult. Then the question arose in my If he feeds so little, how is it that the are in such good condition, and he obtains such in milk? I accounted for it in this way: in tl place, by soaking the food you get a large Every gentleman familiar with feeding anima who has examined closely their excrements, that a vast amount passes through cattle and which is not digested, and is therefore lost. there is a loss, where the food is fed dry, in the matter which cattle reject. I think soaking tl is preferable to steaming it. If you steam to it has no resemblance to succulent green gr natural food of cattle; but when it is soaked tho —made to absorb as much water as it will—it into its natural state, so that it resembles the food of cattle in their wild state. Our cattle six months in the year in an artificial way. I wild state they would migrate as cold v approached to a climate where they could g natural food—green grass or browse. I thi reason that 25 or 30 per cent. of hay and saved by feeding them to cattle after they ha soaked, still producing the same result, is becau brought into the condition of their natural food assumes a common character, and is eaten up Then there is another advantage. Men and fed on one thing will not thrive. If you wa animals closely, you will find that they take variety; and by mixing this food up, you give great variety. At the State almshouse in ou they steam the food for their cattle, and prod same result mentioned by Mr Bernie. They n l them cheaper, but they get a larger quantity of k from the same number of cows than is obtained ny farm in town; and not only so, but they make er butter from their cows in that way.”

VENTILATION OF AGRICULTURAL BUILDINGS.

n Notes Nos. 12 and 18 we illustrated and ribed various modes of supplying fresh air to dings. We illustrate in figs. 1 and 2 a method patented, by which foul air is withdrawn from the rior of stables, cow-houses, and the like. The hod has received the favourable opinion of eminent orities in farming, and is about to be applied y extensively in practice. We shall probably rt on the experience gained by its use.

The system as applied to the ventilation of stables, byres, &c., is illustrated in figs. 1 and 2, and by its use the patentees believe that a system of perfect or absolute ventilation can be attained. The drawing, from its small size, does not shew what forms an essential part of the system—namely, the arrangement by which, while the ventilators are closed, as in fig. 1, a large amount of *ventilation is secured for ordinary circumstances of working*. But when necessary, the full opening, as in fig. 2, can, by a very simple arrangement, be *instantaneously* obtained, thus enabling the interior of the building to be swept clear at once of all foul air and bad smells, making it as sweet and clean as the exterior atmosphere. This system is adapted also in the ventilation of other buildings.

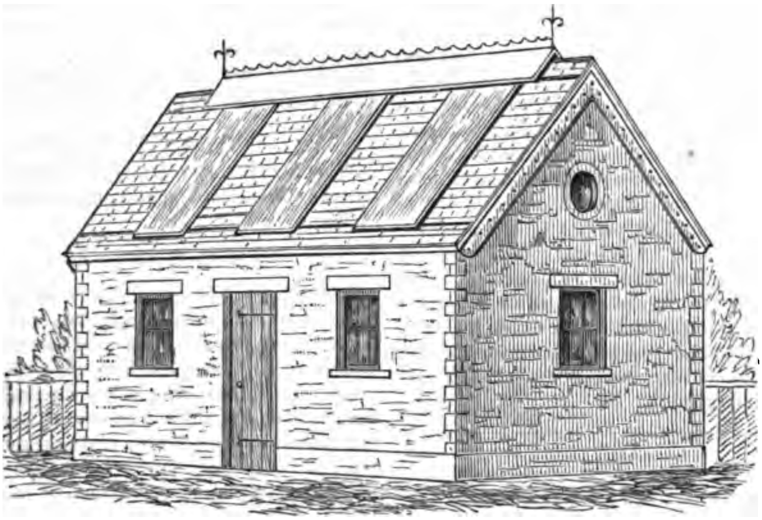


Fig. 1.—A Stable.

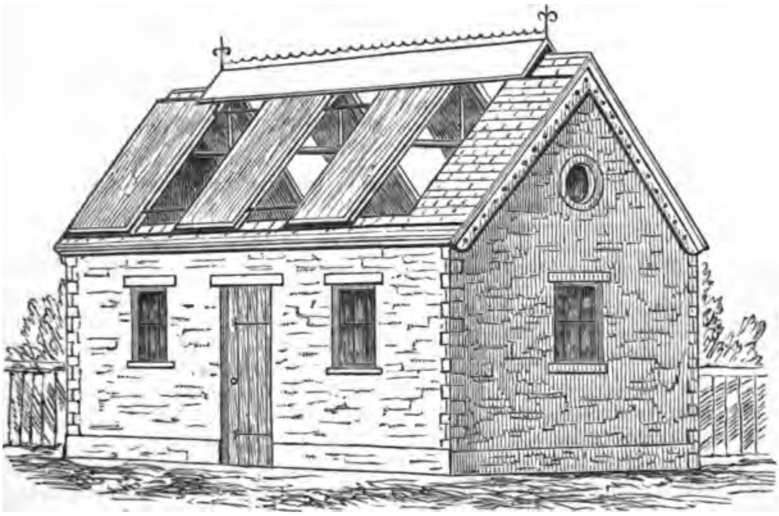


Fig. 2.

XLI. EFFECTS OF GUANO BURIED IN THE SOIL AT VARIOUS DEPTHS.

It is customary to put in guano along with seed, thus mixing it only with the upper part of the soil. We have already noticed in a previous article some experiments in the different ways this fertilizing agent is employed. All these experiments shew that guano is more fertilizing when put in to the depth of 3 inches and beyond that, than when merely mixed with the surface of the soil. In a German district, Pfulydorm, it is usual to deposit guano, on all soils, 2 to 3 inches deep, for colza and other summer produce, and also for the winter crops. It is noticed by this method the efficacy of guano is always real and important; on the contrary, when spread on the surface, it is of little benefit. The great agricultural society of Prague has communicated some experiments, by which we have come to the conclusion that guano should be dug in 3 or 4 inches deep. This method is best when the manure decomposes in the soil without the assistance of the atmosphere, but not with stable-manure, bone-dust, &c. Among the easy decomposed manures there is nitrate of soda, which must not be dug in too deep, or it would be carried away with the drainage. We give the results of some experiments made by Mr Flockhardt at Tharand.

1857. Depth.	Produce per hectare—290 kilogrammes of guano to hectare.		
	Winter Wheat.	Winter Rye.	Oats.
	Kilogr.	Kilogr.	Kilogr.
1. Putting in with seed	2590	2203	7402
2. From 1 to 2 in. ...	2644	2203	7402
3. From 2 to 3 in. ...	4142	2077	7843
4. From 3 to 4 in. ...	4670	2590	8108

Depth.	Effect the second year without new manure.			With new manure.
	Oats.	Winter Rye.	Winter Barley.	Winter Barley
y one blow of the harrow with seed ...	3966	3349	1058	2027
2. From 1 to 2 in.	3613	3525	1704	2654
From 2 to 3 in.	4886	3877	2115	2655
From 3 to 4 in.	5025	4230	2908	3264

he facts mentioned in these table are not very striking n account of the state of the atmosphere during the time hen these experiments were made, and we must re-ark that the burying deep of the guano modified in part ese disadvantageous circumstances. Indeed, if we ad-ut that roots are more quickly developed in soil where hey find more assimilating elements, we can suppose, in eepening the manure, we will develop the roots of the plant at a certain depth below the surface of the soil, and these plants will resist the colds of winter and the dryness of summer. When, on the contrary, the manure is spread only on the surface, it is clear a number of superficial roots are produced—roots which extend no further than the surface soil—and these roots are more sensible of the extremes of temperature.

XLII. QUANTITY OF LINSEED CAKE FOR CALVES.

Would you be so good as to inform me how much linseed cake per day should be given to calves from two to seven months old? also what sort of roots or green food is best for them in February, March, and April? We have no pulping machine.—*C. P.*

XLIII. SALT WITH GUANO.

What is the proper quantity of agricultural salt to sow per acre on corn crops along with guano, &c.?—*J. M.*

XLVI. MANGOLD CROPS.

What plan had I best adopt to raise an extra heavy crop of mangolds and turnips? The land is drained 4 feet deep, manured broadcast—say, fifty loads per acre. I propose using superphosphate, Peruvian guano, and bone-dust. Would there be any advantage in sowing the guano on the ridge, then sowing superphosphate and bone-dust by machinery, or mixing the superphosphate and guano, and sowing by machinery; in short, how can I raise the heaviest crop of roots with artificial manures as auxiliaries? Is there any peculiar style of manuring adapted to the raising of heavy crops of white Belgian carrots? What is the best known means of keeping grain crops from lodging (falling down)? Is liming supposed to have any great effect in keeping them up? I intended asking the same question that a Nottingham farmer does about a Tweeddale plough, but will leave it an open question. Have the celebrated potatoes introduced into the United States by Dr Godesich from South America attracted any attention in England?—*A. T., Nova Scotia.*

XLV. APPLICATION OF BONE-MEAL TO GRASS LANDS.

Can bone meal be applied to grass land with advantage? If not, would you, in your next issue, be so kind as state objections.—*Perth.*——Bone-meal can be applied with great advantage to grass and, and more especially to that which is regularly pastured, but we would prefer applying it in the end of autumn to the present season. Rooks and other birds occasionally devour or carry off the larger pieces of bone-meal, but if it is mixed with from a fourth to a half of dissolved bones, and kept in that state for some weeks before being applied, they will not touch it, the acid employed for dissolving being offensive to them; and when so mixed, it is absorbed in sufficient quantity by either bone-meal or bone-dust to render these distasteful.

Our Library Table.

Manures and Feeding-Stuffs— Annual Trade Circular. By Messrs J. & J. CUNNINGHAM, Edinburgh.

TRADE circulars, except, perhaps, to that class of ardent readers who revel in the delights of advertising literature, can scarcely be called entertaining reading—at least they have not, as a rule, been so written and arranged as to make them so. Still, of late, it is worthy to be noticed, a very considerable improvement has been made in this department of literature—if, indeed, this dignified title is applicable here; and we know of more than one pamphlet which, while designed fairly, yet legitimately, to aid the sale of an article or promote the prospects of an invention, formed, in many respects, not only a readable book, but one which contained much that was exceedingly valuable on the general subject with which it was connected. It might be invidious here to name some of these pamphlets, and, certainly, it would not be altogether appropriate; but it is not invidious, and assuredly it is very appropriate, to name the brochure before us a fair sample of this, the superior kind of trade circular. The arrangement is not only judicious, but the matter practically useful, and, more than that, suggestive—specially so, in more than one direction which we have ourselves pointed from time to time in the pages of this journal. Take, for example, the following, as supplementary, or rather complementary, to what has been already given as the difficulties attendant upon analyses as deducing the value of foods (see the articles "On some Points on the Science of Cattle Feeding")—

"We have referred in former circulars to the inefficiency of chemical analyses, as at present practised, to detect adulteration in linseed cakes. The importance of the subject must be our excuse for again referring to it. Chemical analysis by itself cannot determine if a cake is made from pure linseed, or from say 75 per cent. of linseed and 25 per cent. of poppy seed. We rather think that the latter would give the better analytical result; and yet at the feeding trough it would be found inferior. An analysis is, no doubt, generally accompanied by a note from the chemist, giving his opinion that the cake is of first, second, or third-rate quality; but if this opinion be founded on the results obtained by analysis, and if this process fail to detect adulteration of a certain kind, what is the value of an opinion so formed? If it be so founded, it is an opinion and nothing more, and the skill which is now brought to bear on the adulteration of cake will be found more than a match for the chemist. No doubt, microscopic examination can greatly aid chemical analysis; but few chemists are good microscopists, and the time occupied is far too great to allow of its being resorted to in daily practice."

In connexion with this subject, the hot-water test for oilcake is recommended by the Messrs Cunningham. This is described in the circular before us, to which we refer. The following remarks and report are also worthy of perusal:—

"To those long intimately acquainted with the trade in feeding-stuffs, and who yet are not chemists, it must seem quite a mystery that, while the chemical analyses of finest linseed cake and finest rape cake are almost identical, the market value of the one should always continue some 50 per cent. above that of the other. We are in that position, and have long been anxious to obtain a few rays of light to guide us to an explanation. Reflexion had convinced us that, although the same substances exist in linseed cakes and rape cakes, it was still possible that they might exist in different condition, somewhat analagous to phosphates in manurial substances, which are sometimes found in a soluble, and at other times in an insoluble state. We were further strengthened in this idea by the great variety of results obtained by the use of our water test. By it linseed cake absorbs twelve times its own weight of water, and gives a thick glutinous product; while rape cake absorbs only seven times its own weight, and gives a thin non-glutinous product. We remembered also having read in an old work on agricultural chemistry* that linseed cake contains *soluble* albumen, and with these hints we set ourselves to discover if it was not possible that some explanation of the difference in value between two cakes giving similar analyses might not be found in this direction. We submitted the question to Mr J. Falconer King, chemist to the Board of Trade at Leith, who at once heartily took it up for us, and having made the necessary experiments as arranged with us, he made a very clear report on the subject, which we have now the pleasure of submitting:—

"'Leith, 28th December 1868.

"'Report of experiments made with the view of instituting a comparison between linseed and rape cakes with regard to the amount of soluble albumen contained by these two well-known feeding stuffs.

"'Two sets of experiments were made—one with the cakes as ordinarily supplied for feeding purposes, the other with the original and best procurable samples of each of the different kinds of seed.

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* Johnstone's Agricultural Chemistry, p. 923.

"'The cakes and seed were subjected to the following simple test:—A small quantity was bruised in a mortar with a few ounces of cold water. The pulpy mixture thus obtained was then filtered to separate the soluble from the insoluble portion. The clear watery solution which filtered through was then carefully heated to the boiling point, and allowed to cool. In the case of the thick, rich, mucilaginous-like solution from both the linseed and linseed cake an abundant white clot, closely resembling coagulated white of egg, was found. On the other hand, the thin, poor-looking solution from the rape gave little or no precipitate of albumen, the only effect of the heat being to produce a slight cloudiness in the liquid.

"'From these results it is manifest that linseed cake contains a considerable amount of soluble albumen, while rape cake contains hardly any. These experiments are not so complete as to shew the actual amount of soluble albumen in the substances subjected to examination; to determine this, a longer and more troublesome process would require to be gone through. If, however, when it is present in feeding-stuffs, albumen in the soluble state really possesses as much more value over the insoluble modification as it is generally believed to possess, these experiments, simple as they are, if carefully performed, would, in my opinion, form a very good supplement, if nothing more, to the ordinary analysis of cakes as reported by chemists of the present day, where all nitrogenous substances are represented as albuminous compounds, without reference to the state in which they exist. From such an analysis we can learn the total amonnt of albumen present in a cake; but if soluble albumen is more valuable than insoluble, then it is clear that, from not knowing the proportions in which these two different modifications are present, we cannot tell the value of the substance containing them.

(Signed)
"'J. FALCONER KING,
"'Analytical Chemist and Lecturer on Chemistry.
"'To Messrs J. & J. Cunningham, Edinburgh.'

"Since the above report was made, both Mr King and we have made further experiments with other descriptions of oil-seed cakes, and none of them shewed any traces of soluble albumen.

"To our own mind it thus seems clearly proved that soluble albumen, or some substance closely analagous o it, exists in linseed and in cake made from it, which does not exist in rape seed or the cake made from it. If, then, the albuminous compounds exist in different states in these two cakes, may there not be, hitherto unnoticed, differences to be discovered in their other ngredients? And again, is linseed the only oilseed which contains this substance soluble in cold water? nd is its presence the explanation why its cake has ways sold so much higher than any other? These questions we are not prepared to answer, neither, e presume, is any other person yet prepared to do so, t they are questions which require an answer, and hich open up a wide field for inquiry."

The introduction of new cattle food, prepared under the patents of Dr Dewar, of Kirkcaldy, is noticed in a brief but interesting paragraph. From what we have seen and heard of these foods, we believe that a future great practical utility is before them. Our readers will be glad to learn that the patented processes wil soon be tested on a large and practical scale.

We have often, we may say very often, urged upon the leading agricultural societies to take up and deal thoroughly with many important questions connected with the science and practice of agricultural questions most strangely overlooked by them. We are glad to see this urged in the pamphlet before us in relation to certain questions connected with food and feeding—the one as to the value of oil for feeding, and the other as to the possibility of feeding and fattening herbivorous animals on the refuse parts of their own kind. We think, says the writer in the circular, both questions are of such importance as to be worthy of being taken up by the Highland and Agricultural Society. The ample funds of the Society could not be devoted to the examination of many more important questions. Premiums awarded for reports on experiments by private individuals are all very well, but experiments conducted under the inspection of the officers of the Society will command greater confidence. We think the Society will do well to follow the example of Continental ones, which set us an example in such matters.

Dendrologie—Baume, Sträucher, und Halbsträucher welche in Mittel und Nord Europa un freien kultivirt werden. Kritisch beleuchtet von KARL KOCH, Med. et Phil. Dr., Professor der Botanik au der Freiderich-Wilhelms, Universitäl zu Berlin. Thiel Die Polypetalan enthalden. Erlangen. 1869.

PROFESSOR KARL KOCH is what our Gallic neighbours would call *un homme marquant.* We like the phrase. It implies a great deal more than our own equivalent of a celebrated or marked man. It gives the idea, not of a man who is himself marked, but of one who is marking, or, as it were, making his mark on the age in which he lives. There is something grand in the idea of leaving a mark in the history of an epoch in man's history. We would all like to do it. Few can, but still we make petty efforts in the same direction. If we cannot build a pyramid, or have a monument erected to ourselves, we can at least scratch our names on those that have been erected to others; or, if we are fond of trees and cannot write a "Dendrologia," we may by good luck have the opportunity, which some aspiring spirits have availed themselves of, of gouging out our name in letters a foot long on the trunks of the sacred cedars of Lebanon; or if that is denied us, we can at least cut our initials, and, if we are so minded, those of our sweethearts too, with a penknife on the smooth bark of a beech-tree so deeply, that it shall retain the impress long after the affection which prompted the act is fled and gone—nay, after the hand which traced it is mouldered into dust.

It cannot be gainsaid that these are hommes marquants, but there are hommes marquants and ommes marquants; and if the mark which Professor

Koch has made is not so outwardly visible to the eye, it will last longer and is worth more, and the work which he has just published, and of which the title is at the head of our paper, will deepen the grooves.

If there has been one thing that aboriculturists have been wearying for more than another of late years, it is for an amended edition of Loudon's "Aboretum." The number of species of hardy trees and shrubs known and introduced has been doubled since his days, and many corrections and alterations of species and genera has been made since then. And it is rather mortifying that, instead of a new edition of our own great aboriculturist's work, we have to thank a foreigner for giving us a substitute. Let us be grateful, however, for the goods the gods provide. We wanted a good work on hardy trees brought down to the present state of our knowledge, and here we have one to our hand. It has two defects, indeed, but neither without their salve—it has no plates or cuts, but then we have not to pay for them, and it is written in German, but German is not an unknown tongue, and those to whom it is, may be comforted by reflecting that it can be translated. There is sure to be an English edition.

The present volume will be more especially acceptable to horticulturists—using the word in its oldest sense of fruit-growers. The foresters will be more interested in the second volume, which has yet to come. This one contains the Polypetalæ—in other words, almost every fruit tree of any value that grows in the open air in England—apples and pears and quinces, peaches, apricots, nectarines, almonds, cherries, plums, medlars, sloes, raspberries and brambles, currants, grapes, berberries, walnuts, and hickories. Professor Koch's great knowledge on the subject of cultivated fruit-trees is well-known. He has learned it for himself. He spent four years in travelling in the Eastern countries, from which most of them are supposed originally to have come. He diligently searched Armenia, Mingrelia, the Caucasus, and Asia Minor, for traces of fruit-trees growing wild. He has made a specialty of it—a specialty within a specialty. Every one who had got a notion, or a theory, or a discovery on the subject, has been wont to look to Koch to hear what he would say regarding it; and here we have got a summary of his knowledge laid bare before us, so that now the most ignorant, if they study this book, can with confidence pronounce as well as Koch himself on subjects which have cost him a lifetime to understand.

This is not the place to recapitulate that information; but, as an illustration of his mode of dealing with his subjects, we may cite an example. Take the apricot. In the first place, he does not accept it as a different genus from the larger genus Prunus. The generic name, Armeniaca, therefore, is sunk. Then we find that he regards the four different so-called species of apricot as only varieties of the same thing; but while he does so, he considers the French A. Brigantiaca (the Briançon apricot) as having so far diverged from the parent as to be entitled to a distinct place as a species. We do not think that he is wrong in this. We believe it to be philosophically correct, although opposed to the usual practice in such cases. That practice would rather have led him to unite Brigantiaca to A. vulgaris, and to have kept A. sibirica distinct, there being apparently more probability that a variety found in a distant country was a distinct species than one springing up at home. But Koch would appear so far to have accepted and acted upon Darwinian notions, as to admit all species to be derived from some allied stock, and to think it immaterial what are the means by which divergence into a new form has been produced. If the divergence is slight, he would appear to disregard it, or treat it as a variety, although the one may have come from China and the other from Peru; but if distinct, well marked, and constant, he treats it as a different species, although it may have sprung up alongside the parent, in his own back-green. This, however, is a conclusion drawn from his actions, not from his words. He nowhere (that we have observed) says anything to such an effect. No one can be misled, however, by his keeping such species distinct, for in his account of them, he always tells why he keeps them separate or unites them.

The roses form another interesting portion of this volume. These he has paid much attention to. He divides them into eight sections.

1. The Pimpinellifoliæ, of which the Scotch rose (spinosissima) and the yellow rose (lutea) may be taken as examples.
2. The Cinnamomeæ, of which the Alpine rose is a type. It is generally supposed that the well-known Boursault rose is a cross between the Alpine and the China rose, but Koch does not so consider it.
3. The Hortenses, of which the type is the Provence rose.
4. The Caninæ, or dog roses.
5. The Corymbiferæ—Type, the Ayrshire rose.
6. The Nobiles—Type, the China rose. The present Bourbon rose, according to Koch, is a hybrid between the China rose and the Damask rose. We say the *present* Bourbon rose, because there was an older one of that name, which was a variety of the Rosa gallica.
7. The Banksianæ—Koch makes the Banksian roses only amount to five species—R. Banksiæ, R. microcarpa, R. Sinica, R. Fortuneana, and R. bracteata (the Macartney rose).
8. The Simplicifoliæ, containing only one, R. simplicifolia.

The total number of distinct species of roses, or of distinct forms (for some of them are admittedly hybrids), allowed by Koch, are forty-eight, but a large number of known good varieties are also noticed by him.

A pleasant feature in the work, and one which imparts some human interest to the botanical details, are brief notices of the celebrated men after whom species or genera have been named; and we feel bound to acknowledge that before we read these we had no idea how ignorant we were of the details of the history of, men with whose names we were familiar, through the plants bearing them, but of whose personal history we find we knew little, and that little wrong.

As that is a good addition to the ordinary material in such works, so we find an equally judicious omission. A vast amount of space and labour is saved by dispensing with the authorities for the names and synonymes beyond the first author who has used them. The citation of the work, where this is done, is given, and *the date*, but none of the subsequent authors who have adopted them are quoted. The date is an important item of information, which botanists have, of late years, begun to give; and although it takes up almost no room, we can vouch from experience that it often takes a great deal of time to find and verify it.

There remains another great merit in this book still to be noticed. It is, that it is really and truly, from beginning to end, the work of the author himself. It is not a repetition of old descriptions, in blunders and truth are equally impartially carri new habitation, as an account from day-book to but the genuine work of a new mind, embodyi results of forty years of experience, study, and Such a work will stand when others are forgott is truly an important acquisition to the botanic and horticultural literature of the present day congratulate our readers on its appearance, an soon to welcome it in an English dress.

New Illuminated Texts. London: Ben. (
47 Hatten Garden.

A PACKET of fifty different texts, well select elegantly printed in gold and colours, are a of cheapness (price 1s.), and are pretty ornam nurseries and bed-rooms.

The Garden.

THE SUBURBAN AND AMATEUR'S GARDEN.

CHAPTER VI.

HARDY ANNUALS.

LARKSPURS are annuals that do not bear transplanting well. Their roots are of a tapering nature, and once the principal root is cut and destroyed, the lateral rootlets that push therefrom are insufficient to engender a constitution upon a par with purely seedling plants. There are two distinct kinds of Larkspurs, the hyacinth-flowering and the branching. The former is the earlier of the two, and flowers, like rockets or stocks, profusely up a stocky stem; the latter has a branching, and, in some instances, a rather awkward habit, but it maintains its inflorescence for a much longer period than the former, and the colours, in some cases, are fully as intense and good. In short, some of the choicer of the branching varieties are as good as the perennial Delphiniums, and, of course, they are much more rapidly got up into flowering condition. For a decided effect, either of the kinds are seen to best advantage in rows of some length, but they look well in patches in a mixed herbaceous border. End of April is a good time to sow, and a succession can be had from July to October with the two distinct kinds.

Linum grandiflorum.—This is a valuable acquisition, for ornamental features, to the linum family. When it was first introduced, there was a special "recipe" given forth for its germination, to the effect that unless the seeds were steeped in water at about 120° Fahrenheit they would not spring. Again, it was said to thrive best sown in a dung frame, and transplanted afterwards in the usual way. Both of these, what might be called horticultural recipes, were bad, leading to uncertain and, at best, unsatisfactory results. The better way is to sow the seed as it comes from the vendor in lines about 1 inch deep, in April. The ground, if in good order, will soon incite germination, and the embryo soon develops itself into a tiny little plant, which increases in strength with steady pace. As a rule, it is better to sow thick, and transplant some of the most crowded. Even then, however carefully lifted and planted, the plants never attain the size and strength of the corresponding seedlings that are untouched. In bright weather this fine crimson flaxwort makes a most imposing appearance.

Tropæolums.—In a moist climate, where rainfall predominates, this class of plants, especially those popularly called nasturtiums, is more effective than even the best of scarlet-flowering geraniums. They are all-weather plants, and equally suitable for beds, borders, or walls. Some of them climb freely, if their tendrils are allowed something to lay hold of, and emit flowers at almost every eye. The yellow "canary flower" (T. canariensis) is known very generally, and is much appreciated for its climbing and covering value. In a good season we have seen it cover a space 20 feet high and broad in proportion, and then the multitude of flowers that a single plant yields is something astonishing. It requires to be grown in a full southern exposure, and nailed up against a wall to shew its capabilities. There are others of scarlet, orange, and parti-coloured hues that come in for any kind of work, being useful, when tall, for running up stakes like sweet peas, and equally useful when small, for standing as individuals with very little support in the mixed border. The Tom Thumb varieties are suitable for this kind of cultivation, and can be had in a variety of colours. Equally diverse are the taller sorts, a selection of them in colours being easily obtained from the seedsmen. Early sowing is of importance, so as to have the seedlings coming through the ground about the first week of May. If the plants grow too rampant, cut off a quantity of the larger leaves, and a more profuse show of flowers is obtainable.

We append names and descriptions of the best 12 and the best 24 hardy annuals in cultivation, other than those we have especially noticed and described, for general cottage and villa garden purposes. The best 12 are named first. They should all be sown during the last weeks of April, in order to obtain an early bloom. The choicer sorts from frames will generally succeed them, along with the flowers of dahlias, hollyhocks, and some of the late flowering herbaceous plants:—

1. *Candytuft*, *crimson.*—The best strain of this is very high coloured, and very striking, both at a distance and on close inspection.

2. *Candytuft*, *white.*—The largest strain of this is not much less showy than heads of bloom of white rockets; but seeds, however choicely saved, produce many plants reverting to the original or small variety.

3. *Clarkia pulchella integripetala.*—This is the best of the red-coloured Clarkias, having large flowers, with almost entire monopetalous corollas.

4. *Clarkia pulchella alba.*—The same every way, but white; it does not usually grow so strong and full as the red kind.

5. *Collinsia bicolor.*—One of the very best of annuals; good in habit, and profuse in blooming, with fine bicolored individual flowers.

6. *Escholtzia Californica.*—The best yellow or orange flowering annual in cultivation, opening as the sun becomes brilliant in the morning, and folding its petals together as it wanes.

7. *Gilia tricolor.*—A free-growing plant, never getting over a foot high, and producing multitudinous tricolored flowers.

8. *Lupinus nanus.*—The best of all the lupins—dwarf, free, and showy.

9. *Mignonette.*—Sweet is the perfu
comely and modest-looking the flower
universal favourite.

10. *Nemophila insignis.*—Thousand
plant were wont to be seen in large
and very effective it was when grown
lines. The pale blue flower, contrast
the prominent white eye, is particularl
vating. Good for anything.

11. *Nemophila maculata.*—A grosse
ing variety, with larger flowers, white
striped and spotted. Good for genera
border purposes; both this and the
quire a front-rank position in the bed or

12. *Virginian stocks.*—This is one
tiniest representatives of the whole re
of annuals. It is to be had in a va
colours; and although the flowers do
long, their beauty is attractive. It
body's plant.

13. *Bartonia aurea.*—Another re
tative with large shiny golden flowers;
grower.

14. *Convolvulus minor.*—The large v
coloured flowers of this bindweed gi
marked position among the annual
good soil it thrives uncommonly we
yields abundance of flowers.

15. *Eutoca viscida.*—The bright
flowers with which this plant is adorn
a great attraction. It is not so
flowering as most of the others nam
it unquestionably is a first-rate thing.

16. *Godetia rosea alba.*—Among a
other sorts of the family, this still ma
chief position. Its rose and white
are numerous and pretty.

17. *Linaria bipartita splendida.*—
the dwarfest and prettiest of the far
plant bearing close inspection, and dec
best grown as a hardy annual.

18. *Leptosiphon densiflorus.*—A ve
tinct and telling annual, producing nun
lilac-like flowers of phloxwort character

19. *Love Lies Bleeding.*—A strong-g
species, producing numerous pen
feathery-like heads, of great attraction.

20. *Nigella atropurpurea.*—A good
tinct plant, yielding black and white
foot-like flowers.

veet Sultan, purple.—A highly interest-
t, with large thistle-like flowers of the
cture, only a little late in the season in
them.

weet Sultan, yellow.—Decidedly one
nest of straw-coloured annuals, being
ore effective than the purple, and first-
ner in patches, or when the flowers
for competition, or bouquets.

Vhitlavia grandiflora.—A charming
owing subject, yielding a profusion of
npanulate flowers, which are very at-
when the eye is close upon them.

iscaria oculata.—Rather a tall-grow-
t, adorned with a host of pale rose
with a prominent eye in each of the
s at the base of the corolla.

he tyro that sows these sorts of flowers
beds and borders, at the front of
or villa, and for other places of
retensions, this advice may be ten-
after the borders are dressed—that is,
er with a spade and manured
he sower provide himself, or her-
or the operation is light and easy
a sharp-pointed stick, draw circular
about 1 foot in diameter, from ¼ of
to a whole inch in depth, according
size of the respective seeds. Then
packet, and sow from the packet it-
it is a better distributor than the hand;
ning phrase tally—that is, name and
seed and sowing—on wood, or what
r, on the "patent terra cotta marker,"
an be bought cheap from any seeds-
nd then cover neatly with a garden

CHAPTER VII.

EDLINGS AND OTHER YOUNG PLANTS
URCHASED FROM THE NURSERY.

people buy stocks, asters, hollyhocks,
pentstemons, antirrhinums, pansies, and such like, from nurserymen and florists, who get them up for sale, to supply an ever-increasing demand for showy-flowering plants for immediate planting. To these might be added such things as are kept over the winter, by cuttings, as verbenas, geraniums, calceolarias, and some other flowering plants. As a rule, they are got up upon the high pressure or extreme forcing principle, and require cautious nursing or protecting when transferred to new quarters.

Too many buyers run upon the salesman with great avidity, at too early a period of the season. Hence many of the plants die and there is nothing but dissatisfaction to all parties. If buyers, as a rule, when they have secured their lots, would plant them temporarily close together in any salient spot, and in the event of cold weather prevailing during May, if a cover of some kind were provided, they would be great gainers. The plants would get hardened off sufficiently to bear isolation with impunity, and the yield in growth and flowers would be correspondingly increased. To proceed upon the assumption that because a buyer has got so many plants, there ought to be so much outcome, without taking precautionary measures, is certain to end in discomfiture and defeat. Caution is requisite in this, as in every other step one takes in life, to secure propitious sequences. Early planting, without regard to the constitution of the plants and the fluctuating character of the month of May, and even the early weeks of June, may end in a late harvest of flowers, even if that can be reckoned upon at all. Pansies, pentstemons, and antirrhinums form an exception to the others named, and may be safely planted in April and May, according to the climate of the locality.

SEA-KALE AS A CULINARY VEGETABLE.

THE sea-kale (Crambe maritima of Linnæus), and named by early English authors Brassica maritima, Brassica marina Anglica monospermos, sea colewort, sea cabbage, &c., although now pretty generally grown in British gardens, is still deserving of far more extended cultivation than it has yet received, whether for its usefulness as affording healthy and agreeable human food, or as a cattle-feeding agricultural plant.

The sea-kale grows naturally on the sea shores of Continental Europe, from the Mediterranean to the southern coasts of Sweden and the Baltic; it is by no means uncommon on those of southern England, and extends with decreasing frequency north to the estuaries of the Forth and Clyde in Scotland; while it occurs occasionally on all the coasts of Ireland.

It appears that the garden culture of sea-kale was somewhat simultaneously introduced through Britain shortly after the middle of the last century; but until near its end little gardening skill seems to have been bestowed upon its growth, for forcing it for winter use was not so much as hinted at by authors of the time, and in its out-door management little was done beyond imitating its natural sea-side growth, by covering over the crowns in the end of October or beginning of November with from 3 to 4 inches of sand or gravel; and as the young blanched shoots were cut as soon as they were observed to be pushing through the sand, their length corresponded with its depth, consequently they could [illegible] presented but a poor appearance [illegible] sea-kale [illegible] ordinary mar[illegible]

[illegible]

[illegible] hitherto been almost entirely neglected in other European countries, as well as in North America. One assigned reason for this is its incapability of withstanding the rigo continental winters, for notwithstandin its natural range of habitat extends to 60° of N. latitude, it must be remen that, being strictly a sea-side plant, it there exposed to the extreme low winte peratures which prevail at correspondi titudes in inland districts.

In the cultivation of sea-kale, the essential is a perfect drainage, which secured, it will grow luxuriantly in all or garden soils, provided they are well en with farm-yard manure, supplemente annual dressings of sea-weed, or comm salt; but it prefers such soils as are somewhat loose, open, stoney, or g nature. It is propagated either by se by cuttings of the roots. When by the these may either be sown in autumn, they naturally drop from the stems on they have grown, or in March; in eithe at a depth of about 2 inches, but vary thickness, consequent upon whether th to remain where sown or to be transpl In the first case, the drills may be fr inches to 2½ feet apart, and an ounce o will be requisite for about 30 feet of and in the second, a like quantity m sown in 20 feet of drills, or o square yards broadcast. When gated by root-cuttings, these s be taken off the long thong-like ex ties of the old roots. As these la lifted for forcing, cut in 3 to 4-inch pieces, and lay in heaps, slightly mixe dryish sand, till February, when they s deposited thickly in beds, and co with about an inch of sand or light till the young buds commence to through the covering; then they shou taken up, all buds except one rubbe each piece of root, and these last immed planted at rather more than their f depth in drills 15 inches apart, and 12 i between the plants, if they are intend

ıp for forcing, after standing either
) years; and 2½ feet wide by 15 to
apart, when they are to remain in
d for successive crops. It was
he universal practice never to take
f sea-kale plants till they were at
years old; but modern enter-
. particularly that of our market
will brook no such unremu-
lelays; and, whether reared from
root-cuttings, the plants by
eatment are, at one year old,
produce excellent returns. Far-
l other amateurs who may not
ular forcing-pits at their com-
n, notwithstanding, easily secure
upplies of sea-kale from about
e of December till June, by taking
ants with 12 to 15 inches of their
ny, thong-like roots attached, care-
ing them among good soil in pots,
d casks, or on temporary plat-
feeding byres, stables, cellars, &c.,
them well at planting with tepid
which 2 ounces to the gallon
s been dissolved, repeating the
erwards when necessary. From
)° is about the best temperature
g sea-kale; but in cellars and
ces where that warmth cannot
niently maintained, the plants will
ost equally as well, although they
re longer time to become fit for
For the last crops of the season all
quired is to cover the plants in the
nd with sea-kale pans, pots, boxes,
appliances which will exclude the
l in no case would we recommend turning either the sea-kale or rhubarb brakes of the kitchen garden into something like dung-yards, by using stable manure or other litter for forcing the plants where they grow. In its summer and autumn culture all that is requisite is to cut off the flowering stems as they appear, which will materially strengthen the plants; and to keep them at all times clear of weeds, which is easily accomplished, seeing that salt may be advantageously applied to it at any period, in sufficient quantities to destroy almost all weed vegetation.

The principal vermin and insects which cultivators of sea-kale have to contend with are mice, which are very fond of its seed, and eagerly devour it, whether when ripening, in the seed drawer, or when sown. Slugs and snails are troublesome alike in devouring the very young plants, and in disfiguring the blanching heads; but occasional sprinklings of salt, applied on the surface of the ground in the evening or at night, will effectually stop their ravages. In some old gardens, where the cabbage club-root, produced by the larva of Curculis contractus, is destructively present, it also attacks the roots of sea-kale; but it might be overcome by top-dressing with bone dust, which is reputed to be obnoxious to that pest; and salt frequently applied, when the flies are depositing their eggs, would also be likely to prevent their development. Rabbits will eat off the crowns, and also excavate the roots deeply when they are scarce of winter feeding. But some further remarks in regard to them, and on the use of sea-kale as a supplementary cattle-feeding plant, we reserve till a future number.

Rambles by Road, River, and Rail,

A TOUR IN THE WEST OF SCOTLAND.

VII. FROM GIRVAN TO CASTLE KENNEDY.

THE tourist who is bent upon visiting Wigtown and the Border counties, is treated to a most agreeable prospect by proceeding from Glasgow, *via* Girvan, per rail, and from thence, per coach, to Stranraer. To us, who had so many places of call by the way, there was an uninterrupted source of pleasure and attraction. New friends were added to an otherwise long list, and invitations to extend our holidays and the breadth of our projected tour were pressed upon us; but as our journey was mapped out, and friends advised, we were reluctantly compelled to be inexorable. Only once did we deviate from this course, but it did not inconvenience our movements. It was during the twenty minutes interval of the arrival of the train and the starting of the coach, which was certainly well spent in visiting the villa grounds of Mr M'Echnie, one of the enterprising commercial inhabitants of the town of Girvan. This is a nicely-situated seaport town, of about 8000 inhabitants, weaving being the chief branch of industry.

The grounds of the gentleman above-named do not comprise over a couple of roods, but they represent quite a *multum in parvo*, such as many could imitate, and have ecurring food for observation and study. butting the house are two vineries, the one o and the other 25 feet long by 12 feet wide, vhich were heavily cropped with grapes, and n good style of management, superintended ipon the principle of "Every man his own ardener," and resulting in such success as ould or ought to put some practical garleners to the blush. In the centre compartnent which forms a sort of corridor between the two houses, were some decorati
of the pelargonium and other races, a
of the best sorts were shewing a pr
florescence. Then, in front was a
terre, gaily bedecked with flowers an
on a grassy groundwork, while the
encircled the feu or holding were
with wall fruit, and on the borders w
plants of apples and pears as standar
admirable manner in which the w
kept enhanced the effect, and she
much might readily be done with sc
like systematic employment of a nea
jobbing gardener. The quiet enthu
Mr M'Echnie in horticultural subj
well directed, as was clearly manifes
practical eye in the selection rather
collection of articles under cultivatio

We saw all this, when the blowing of
apprised us of the necessity of procee
all speed, and taking our seats upon
stage-coach. The route lies for
fringing the sea-shore, and of a c
and irregular outline, rendered n
partly by the line of the beach, and
evade the displacement of some i
boulders and stratified masses of r
seem to have been upheaved at som
of the earth's history by internal com
In fact, the great height which cha
many of them, and their almost perpe
outline, are as singular as they are gra
posing to the sightseer. Those who hav
belief, and credit the appearance of app
might readily be excused becoming
nightfall, if such coveys of hawks and j
as we saw hovering about mingled thei
dant noises on being disturbed while
upon their nests towards the summit

ntled rocks. Miles and miles are
d over by the willing “beasts of
,” and the eye is completely shut out
rd by these rocky walls; scarcely
g is visible but the Firth of Clyde
a glimpse of the land over which we
assed, fringing the sea, and the cone-
cairn of Ailsa Craig rising high in the
of the waters. Sea-gulls are kissing
ater with their wings and their
in thousands. Anything in the
of vegetation is terribly scourged;
s are immature, and reproducing
lves from the intense heat and
humidity; in truth, this is a parched
here the sheep look in vain for fodder
climb these all but rocky fastnesses.
ry autumn of 1868 will be remem-
even in South Ayrshire—from Girvan,
st, as far as Ballantrae. We
arlton Castle, one of the old ruins
country, belonging to Sir John Cath-
nd several thatch hamlets, that are
uous for anything but comfort to in-
who fortunately know no better state
s. The scenery is imposing, but bald
ricultural point of view; but whenever
Ballantrae, and come to the more im-
borders of the two shires of Ayr and
n, a better state of agriculture prevails,
of a better groundwork for it. Mr
lson of Auchearn, and Mr M‘Gibbon's
en, are admirable holdings, and shew a
reater desire for the comfort of those who
usbandry of the district. Neatly white-
walls and slate roofs take the place of
ttages and thatch coverings, and the
ppears to be fertile as far as the eye
ch inland.

road from Ballantrae to Glenapp in-
ground covered with some very rich
of both agriculture and arboriculture
in the sense of large wood, but in the
nd exuberance of the spruce and larch
lly, which rise up in great beauty of
all along these undulating hillsides.
p estate belonged at one time to Lord
, but it has now fallen into the hands
f the iron lords of Lanarkshire—James
. It is delightfully situated at the mouth of Loch Ryan, and the drive, first up hill and then down the base of the rocky declivity, is decidedly the finest and most picturesque in the whole route. The hill sides are clothed with larch, spruce, and bits of such copse as bramble, wild heath, and common bracken, which contrast well with the bold-looking summits of rock that lighten up the amphitheatre-like picture, which is enhanced as the silvery waters of the lake widen out to the eye in the progress onwards.

Now that we are at the mouth of the glen, we have an admirable view of the land on the opposite side of the lake. The first thing coming in contact with the eye is a monument erected to the late Sir Andrew Agnew. It was in this lake, by the way, that the Royal fleet anchored on her Majesty's second visit to Scotland. The estate of Corsewell, once owned by Sir John Moore, of Corunna celebrity, is well observed by the tourist; but the drought is painfully apparent upon every blade of vegetation. Much as the counties of Scotland generally suffered, the borders of Wigtownshire and the Stewartry of Kirkcudbright—at least such portions of them as met our gaze—were parched to a maximum of aridity. The cereal crops were not the length, taking straw and grain-head together, of the quill we are writing with, and the root crops positively a failure throughout. The cattle in the fields were looking wildly about as if some murrain had overtaken them, and little wonder that many of them succumbed to the direst of all wants of the animal race—water. No such drought had ever been experienced along these coasts within the memory of that much-drawn-upon authority—the oldest inhabitant; not even the memorable '26 had been so scourging and damaging in its effects, for no rain of any consequence had fallen in the district from the 22d of May up to the time of our visit in August. The drive round the one half of the lake was, therefore, bereft of much of the interest and beauty that generally crops up to the eye of the tourist, when the golden crops of grain are waving over the fields. Nothing of much interest was noticeable, unless it were the great breadth of sands that might be utilized for purposes of cultivation along the sides of the lake to where Stranraer is picturesquely situated. Springs of fresh water bubble up as the tide recedes, and appear to be as "strong" as they are numerous. Looking at this town from the distance, it seems more imposing and extensive than Girvan. It is a famous agricultural market place, and, judging from the numbers of farmers and others interested in agriculture present, there must be a large trade done.

Alighting from the coach, after having passed Craighaffie, which belonged to Admiral Nelson, and observing an old Roman moat beside Intermesson, we found ourselves in time for a kind of *table d'hote*, which we relished amazingly; and we were in the course of an hour or two afterwards on the direct road for Castle Kennedy and Inch Castle, the demesne and seat of the Earl of Stair.

Plantations and Hedges.

ON THE TRANSPLANTING OF FOREST TREES.

[Read before the Arboricultural Society.]

BY CHRISTOPHER YOUNG MICHIE, FORESTER, CULLEN HOUSE.

NO branch of arboriculture more urgently demands our attention, study, and terest, than that of planting or transplanting rest trees, and it is only upon close obser- tion of what takes place in nature, and by serving as far as we can the operations of r unerring laws, that we can reasonably ex- ct success to attend our labours.

By nothing short of the most attentive ob- rvation, lengthened practice, and protracted perience, together with careful study and inute investigation as to the results of our wn and others labours, are we enabled to quire anything like a competent knowledge quisite for the prosecution of the art of anting. In order to attain to success in lanting, we require the refined taste of the tist, the foresight of the philosopher, and e skill of the scientific, especially as relates the laws of physiology. The writer does not resume to infer that he is fully acquainted ith all the various conditions upon which ccessful planting or transplanting depends, t he believes that his experience in the actice of that art will be found of sufficient erit and importance to be worth recording.

HARDWOOD TREES.

One curious circumstance connected with ansplanting hardwood trees came under the riter's observation about twenty-eight years o: a farmer having occasion to fix two te-posts at an entrance to one of his fields, ought proper to use two sycamore trees for e purpose. Experience having taught him at the heavier the posts were at the base e firmer would they remain in the ground, e trees, therefore, instead of being cut own in the usual way were grubbed round the base, cutting nearly close to the trunk all the principal roots. The trees were thus lifted with a club base, but without any small roots or fibres attached.

The trees after being felled, were cross-cut at about 7 feet from the ground, thus leaving that part intended for the gate-posts entirely void of branches, and almost equally so of roots.

Holes having been prepared, the posts were put into the ground, about a foot deeper than they stood when growing. The ground was firmly beaten around them, and the gate hung between them in the usual way. The work was performed about the month of March, and by midsummer the posts began to produce shoots near the top. Next season the shoots were prolonged, and the growth uniformly continued till about five years ago, when the bark of one of them began to decay at the surface of the ground, from which cause it soon withered; the other, which the writer saw lately, is still in a growing state, but the bark upon it also at the surface of the ground appears unhealthy, and the tree is not unlikely soon to fall a prey to the same disease. Speaking of the two trees as one, they would now be about seventy years old from the time of original planting. At 6 feet from the ground, they girth 40 inches, and are about 20 feet high, with spread of branches about an equal number of feet. Many trees in the plantation from which the above were taken are at present quite as small, though these are considerably below the average size, notwithstanding, at the time of removal, they were the largest. The difference of size is, doubtless, due to various causes, such as the mutilations they sustained at removal, and the undue depth at which they were put into the ground. The cause of premature death in the one, and that which is likely soon to cause the death of the other, is almost unquestionably the result of too deep planting.

Though the above system cannot be recommended for removal or transplantation of large trees, seeing the top, wherein consists the beauty of the tree, is entirely cut off, yet enough is to be learned from the practice of reducing the top to such dimensions that it may be maintained in life through the vessels of the roots, that certain modifications of the practice may, with advantage, be carried out in practical operations of planting.

Another interesting instance occurred in another part of the country, in the following manner. In the course of erecting a farmsteading, an elm tree was found to stand in the way. From the size of the tree, and the advanced season of the year (the latter end of June) it was deemed inadvisable to attempt removing and transplanting it. Whilst the workmen were engaged digging up the tree with the view of carting it away, the proprietor, an intelligent nobleman, happened to pass at the time, and very courteously tendered his advice, by recommending to lop off a considerable portion of the top of the tree. This was accordingly done; and although the work was somewhat rudely performed by unpractised labourers, yet the success has been everything that could be desired. At the present time the tree is considerably larger than any of the same age in the plantation from whence it was removed. Why this tree should be of faster growth than the others is only to be accounted for from two circumstances, viz., the breaking up and rendering the earth loose and open around the roots in [illegible] transplanting, and that of the [illegible] which it was planted, being [illegible] least six [illegible] general level of the ground [illegible] ances the surface roots [illegible] develop and expand to [illegible] extent.

Another instance clearly indicative of the importance of reducing the tops of trees in proportion to the roots by which they are sustained, came under the writer's observation five years ago. From fifty to sixty trees at one time had been left in a private but vacated nursery, and after remaining till they attained from 15 to 20 feet in height, were transplanted in the vicinity of a village, in order to produce immediate ornamental effect in the landscape. This took place about twenty-five years ago, and with apparent success. Owing to subsequent improvements in the place, it became necessary to lift and transplant the whole of the trees, which had now stood about twelve years in their situation. On their removal they were carefully dug round one year previous to lifting, their tops were also partially reduced, and the whole operations were conducted with skill and care, and resulted in the whole trees growing well.

Again, in about eight years, owing to the widening of a road near the village, it became once more necessary to lift the whole row of trees, and remove them backwards a distance of about 5 feet towards the field side. On this occasion the trees were lifted without any previous preparation by way of digging around their roots, and were planted without reducing their tops. The results are that, up to the present time, more than one-half of the trees have perished, and the remainder are sickly and not likely soon to overcome the effects of their removal.

Considering the advantages these trees enjoyed by having previously been removed several times, and consequently more than usually well-rooted, they would almost certainly have grown and flourished well but for want of the necessary skill in reducing their tops within due proportions.

Twelve years ago the writer conducted the lifting and transplanting of a fine English oak The tree originally stood on the margin of plantation, about 150 yards distant from th place to where it was transplanted. No preliminary preparation was made for transplanting it. The tree was dug round and carried t its new site the same day, upon hand-spoke bound with straw ropes to prevent them fro injuring the bark. The tree was carefull lifted with a large ball of earth adhering

, and planted with due care and
. It was well clothed with branches,
portionable in every respect. Its
as about 25 feet, girth of stem near
d 2 feet, part of stem clear of branches
e twenty-eight years, and was planted
nonth of March in a very healthy
d under generally favourable circum-

No top pruning was performed,
tree looked perfectly healthy, and
l till about the beginning of July, when
sudden every leaf withered and
d up, as if singed by lightning, which
nced persons assigned as the cause
ath.

us to know, if possible, the true cause
enomenon, the writer set to work to
the tree, and found that not only
es and branches dead, but the trunk
quite dried up, shewing that the
re the last part of the tree to indi-
nce of vitality. On cutting up the
ecemeal, to discover if any part was
found it quite dry down to within 6
the root. He cut over the stool to
inches of the ground, rounded, and
essed it, and in a short time shoots
burst forth. One of these, to which
e was given (the others cut away),
that season the height of fully 4 feet,
g subsequently found in the way
vements was afterwards removed.

se of failure in this instance evi-
ose from the undue proportion of
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it, the latter not having sufficient
convey the necessary sap. Why
e top and trunk of a tree should
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olly or partially, the stem at least is
alive.

iter is aware that the operation of
ng is objected to on account of dis-
he tree; the latter, however, is the
ly when done by unskilful and un-
hands, and has by no means a bad
en carefully performed.

oring the writer had the opportunity of observing an elm tree planted in a conspicuous public place; the tree was only 14 feet high, but very proportionably and well grown. The work of planting was well performed, and at a good season of the year (the latter end of March). From the size of the tree, its state of growth, &c., success might have been anticipated, yet total failure was the result. After midsummer the tree gradually languished and ultimately died. The thought irresistibly suggested under such phenomena is, "What is the cause of death?" What the cause of the sudden change which the tree has undergone? The tree underwent no operation preparatory to transplanting, either by way of lightening the top or by cutting its roots, which, if done, would in all probability have preserved it alive. Thus it must appear that though the tree died for want of power to absorb moisture, this evil might have been prevented in different ways, such as by reducing the demand upon the roots, by diminishing the evaporating power of the leaves, by administering artificial substances as food, or by watering the roots and leaves.

A birch tree 40 feet high was lately transplanted. The tree was dug round and removed with a large ball of earth about 6 feet diameter, containing the greater part of the roots belonging to the tree; and no lopping or top pruning was in this case performed, nor the tree in any way prepared till the day on which it was lifted. The tree, on being dug round, had a large clear opening made to give free access to the workmen to undermine it, and to allow the implement, termed a janker, access to it for loading. The janker, as it is termed, is a machine of very powerful, but simple construction, consisting simply of two large strong wheels, and cranked axle, with a long pole attached to it, which acts as a magnificent and powerful lever. By increasing the diameter of the wheels, and with axle and pole proportionably large and strong, any ordinary sized tree may be expeditiously, efficiently, and economically removed; the only risk being that of shaking the earth off the roots. In the present instance, no severe shaking took place so as to disengage the earth attached, as the journey was only a few hundred yards across a smooth lawn. The tree, in being placed in its new position, was found to have its ball of earth quite perfect, and entirely interwoven with small roots and fibres. After transplantation, the tree was copiously watered, which induced the fine sandy loam closely and compactly to run in amongst and adhere to the roots, an almost insurmountable difficulty in transplanting amongst tenacious clays, and one of the chief causes of failure under such circumstances. Beyond copious regular waterings two or three times a week, and that of supporting the tree against the influences of the wind, nothing further was artificially done to secure its growth. The situation from which it was taken was considerably exposed, while that to which it was transplanted was well sheltered. The means to which success in this case may be ascribed were, the perfect state of the ball of earth, preservation of fibrous roots, due attention to keep the tree from undue agitation by the winds, and regular and copious watering whenever the state of the weather so required it.

An oak tree of large size, weighing several tons, was successfully transplanted in a nobleman's park some years ago. The tree was dug round in the usual way at the time of removal, and conveyed to its new situation upon a janker. On having to pass through several gateways, much inconvenience was experienced, as the gates and posts had to be removed in order to allow it to pass. The tree received due attention by copious watering, together with having some parts of the largest and longest top branches judiciously reduced. It was also well sustained against prevailing winds by moorings of wire. The tree originally stood in an open exposed situation, and upon a light loam, being well furnished with branches, [illegible] th roots. The [illegible] transplanted was considerably [illegible] the soil moderately rich and [illegible] the tree for some time subsequent to removal appeared somewhat sickly, but soon regained its wonted vigour and health, and is now in a thriving condition. The forester who conducted the work connected with the transplantation was a man of great experience, and knew well the circumstances under which forest trees grow or decay, according to the depth at which the roots are placed in the soil; and in accordance with this knowledge he planted the tree in an elevated position by artificially raising the ground where it was planted. To this and to the former circumstances is probably due the healthy and vigorous state of the tree at the present time. No doubt the large ball of earth adhering to it, numerous fibrous roots attached, suitable soil, reducing of its top branches, and watering when required, all contributed in accomplishing the favourable state of growth. Encouraged by the circumstance of observing that trees not only grow, but flourish, under conditions apparently the most unfavourable, when their tops are cut off or greatly reduced, while under similar circumstances they perish with their tops remaining uncut, the writer resolved to make a fair trial upon the branches of a tree generally allowed, of all others of the hard-wood class, to be most difficult to transplant when of large size. In the spring of 1857 an opportunity occurred for making the experiment at P——d. The proprietor desired a hedge to be planted at once, fence high, and intrusted the work to the superintendence of the writer, who procured, from a plantation close by, beech trees to the number required. The trees were grown as a sort of underwood amongst larch—the latter being rather thin upon the ground; the former stood openly amongst them, but were by no means handsome trees, being deficient of side branches, and, having been originally planted at the same time as the larch, were consequently nearly of the same age; but while the larches were from 40 to 50 feet high, some even exceeding the latter height, the beeches were generally from 10 to 20 feet, except a few on the margin of the plantation, which were further advanced. On digging up the beech trees little or no earth adhered to them, and the fibrous roots were few in number, and, on being carted to the place of transplanting, the little earth that originally adhered was entirely shaken off. A trench 4 feet wide and about 2 feet deep was prepared along the line of the intended hedge, in which trench the trees were planted about a foot apart, and in the usual way of hedge-planting. On preparing the bed for the reception of the plants, a quantity of partially decayed leaves and road scrapings were collected, mixed together, and put into the trench to the depth of about 18 inches. After the trees were inserted, the roots were covered with the same mixture to a depth of about 6 inches. This being done, and well watered, the trench was filled in to a little above the level of the natural ground, the usual subsidence being calculated upon to form a receptacle for water, in case of its being subsequently required in an artificial form. The work of planting having been completed, a hand-saw and hedge-bill were employed in cutting over the plants at about 4 feet high, leaving them in a neat smooth condition, at once a fence and ornamental screen. When last I saw the hedge it was in a very growing condition, very few of the plants having perished or gone back; and, on recent inquiry respecting it, the writer was informed that it continues in the same flourishing state.

At the time of planting this hedge some trees were planted out for ornamental purposes, and were treated in a way similar to the hedge as respects soil, leaf compost, &c., except reducing their tops. The results in the latter case were that only about ten per cent. lived, and those died down to near the surface of the ground, thus shewing the important effects of top pruning. Having fully satisfied himself of the various results and changes produced upon trees by cutting their roots and branches, and of the great amount of power in the hands of the planter to produce whatsoever results he pleases, his next inquiry was, how far soil affects their growth, both in their newly planted state and subsequent growth.

About twenty years ago a cutting was made in order to level a country road, and certain embankments were thus formed in doing the work. Upon some of these embankments trees were planted which were lifted out of contiguous plantations for the purpose. On one of the embankments referred to, a number of oaks were planted, from 10 to 12 feet high. These have now stood nearly twenty years in their present position, and the tallest of them is scarcely yet 14 feet high, while many of the others are actually shorter than when transplanted. These trees were lifted out of a cold clay soil and transplanted into one of a similar nature. The only circumstance calculated to favour their growth in their present position over that from whence they were removed was the open and pulverised soil of the embankment and dry position upon the sloping banks. These favouring circumstances, however, seem fully counteracted by the extreme exposure and infertility of the soil.

Having witnessed the unfavourable results upon trees removed from cold clay soils such as that referred to, and transplanted into soil of similar qualities, he was further anxious to witness certain results under different circumstances, such as the removal of trees from a warm dry soil to a cold and damp one, and also of seeing the effects produced by removal from a cold unfavourable soil to that of an opposite extreme.

A small proprietor had a number of oaks and other trees taken from a large plantation, about twenty years old. The soil of this plantation was a strong red clay, and the trees when taken up had scarcely any earth balls attached to them. Being for ornamental planting, the trees were selected with all due regard to their form and proportions, and were very carefully taken up, so as to inflict as little injury as possible on the roots. The trees were carted to their new destination, a distance of several miles, large pits were dug for their reception, and every possible care bestowed in planting them. The soil into which they were planted was loam of various qualities, the most inferior parts of it far surpassing that of the plantation from which the trees were taken. The results have been that scarcely any of the trees are yet taller than when removed about fifteen years ago. They are, however, in some cases, making considerable growth latterly, but are at most but large spreading bushes.

It was found lately on examining the roots of the trees that the original ones had completely decayed, and a new class of fresh ones had originated from the lower part of the stem. About one-third of the original number of trees planted perished during the first five years after removal.

During the month of February 1850, a row of trees was planted upon the side of the highway between J. and D. The trees were lifted out of the adjoining plantations, which were about twenty years planted. The soil in the plantations was generally loam, rather light, and the trees on being lifted had their roots greatly bruised and mutilated. The soil to which they were transplanted was a tenacious clay. The trees, while badly rooted up, were equally destitute of side branches, having much the appearance, about a year after planting, of maypoles or rural fishing rods. The side branches, though few in number when the trees were transplanted, had still further diminished, till almost entirely destitute of them. Not only were the branches dead, but the bark had also become detached from them, and hung in unsightly shreds waving in the wind; while the branches themselves appeared white as ivory from being washed and weather beaten. Indeed, at that stage, nothing more unsightly could possibly be seen, and few proprietors could have resisted the temptation of cutting them down. The line of trees contains altogether 105, being now ten fewer than the number originally planted. The cause of [illegible] trees perishing was consequent [illegible] rubbing against them as they [illegible] against [illegible] stood 30 [illegible] the hedge [illegible] species of trees com- [illegible] beech aspen, and [illegible] balsam poplars; the greater number, however, are sycamore. The writer, having frequent occasion to pass along the highway, took particular interest in watching the progress of this strange unpromising row of trees. During the first five years after planting they made no perceptible progress, but in several instances became actually smaller than before planting. The first signs of vitality were the putting forth a few small shoots at the junction of the old branches with the stem. During several winters subsequently the number of dead branches upon them made them still appear as if quite lifeless. During the next five years, and up to the present time, the progress of growth has been quite marvellous: not only are the stems shooting up in the centre of the trees, rapidly assuming the character of timber, but the branches are growing equally well horizontally, altogether forming, if not magnificent tops, at least handsome and beautiful trees, well formed, and proportionably grown. The trees generally have from 6 to 8 feet of stem clear of branches, owing in some measure to sheep and cattle browsing upon the lower branches. General height of the trees from 15 to 20 feet, girth of stem near the ground a corresponding number of inches, which is a good proportion. In this case nature unaided and unassisted was about ten years in accomplishing that which by the aid of art she would have done in five years. One remarkable circumstance in this case was the small number of trees that actually perished.

The solution of the problem appears to be this: the trees were so far deficient in branches as to give the roots the vantage power over them. The branches upon a tree are arranged and disposed very much as the roots' are. In this case, however, in consequence of the trees previous to transplanting having grown up closely together amongst others, they thus underwent a natural process of pruning, which, to a considerable extent, explains the obscure circumstance.

In 1858 the writer planted a considerable number of trees of various sizes and sorts for ornamental purposes, comprising chiefly oak, lime, sycamore, and horse-chestnut. The district was well furnished with pine plantations, but few hard woods of any sort were to be seen. Much of the arable land of the district, though in a high state of cultivation, is nevertheless naturally poor. The subsoil, too, is uncongenial to most sorts of hardwood trees. An effort was made to clothe the barren and bare roadsides by introducing hardwoods, which form a pleasing contrast to the dull pine plantations and square fields around. Two difficulties in the outset stood in the way, neither of which was easy to surmount—the one was a want of the proper sort of trees at command; the other an unsuitable soil. Operations of planting, however, were commenced and carried out as best they could upon a somewhat extensive scale. The lime trees were originally grown in an advanced private nursery a few miles off, with a view of transplanting for immediate effect. The trees were thoroughly well rooted, having been, while in the nursery, several times lifted and transplanted for the purpose of improving their roots. The trees were from 10 to 12 feet high, well clothed with branches, altogether forming handsome trees, and likely to do well. In planting, the pits were duly prepared, soil was taken from the fields adjoining, and put into the pits to encourage the growth of the trees. After planting, supports were put to them to insure stability against the prevailing winds. At first, the trees bade fair to thrive, produced broad healthy leaves the first season, and in some cases several shoots; gradually, however, signs of sickness began to appear, the leaves by degrees became smaller, and early in the season assumed a rusty appearance, and became autumn-tinged long before the end of the season. At the end of autumn, many of them had perished down to within 2 feet of the surface of the ground; and when last the writer visited them, the whole, with only three exceptions, might be regarded as a complete failure. The exceptional trees were planted upon deep rich loam, mixed with road scrapings. From the general appearance of the whole trees the writer was led to believe, that the chief and only cause of failure was poverty and coldness of the soil. That the trees grew well at first, or at least appeared to do so, was consequent on the sprinkling of earth borrowed from the fields, and put around the roots, which, when once the roots had gone through, the trees languished and ultimately died. The manner in which the failure was produced may be further accounted for, from the circumstance that the trees, when in the nursery, were grown upon very rich loam, and in a sheltered situation, which circumstances combined, rendered the change sudden and perilous. What took place with the lime trees took place, also, with the oaks, though the latter were much more tenacious of life. The horse-chestnuts, though none of them are quite dead, are also in a languishing condition, but would apparently recover were it not for the injurious effects of the wind upon their leaves. The foliage of the horse-chestnut being large and soft in early summer, suffers much from exposure. Owing to the gummy nature of the buds, however, it is enabled to endure the severities of winter better than most other trees, which is so far in its favour. The sycamores are of all others doing best, and are likely to become handsome ornamental trees of moderate size. They were by no means so well prepared for transplanting as the limes and others were, having stood too much confined before removal in the nursery ground. The leaves, however, are large, and of a fresh healthy colour, such as usually indicates success. The sycamores were further submitted to worse treatment than the others were, by being planted in the most inferior soils. There is, from what may be seen in the above trees, no reasonable doubt that sycamore will grow and even flourish upon soils too poor for lime, oak, elm, and many others. One precaution, however, is necessary, viz., to avoid planting where its roots will reach stagnant water or tenacious clay. The locality from whence the trees were taken is situated at an altitude about 200 feet below that to which they were transplanted, and is also much exposed to north and east winds. The soil is a light sandy loam, varying, however, at places from a deep rich dark loam to a light sandy soil.

Altogether, it might have been predicted that the change to the trees must have been unfavourable in the extreme. The trees in this instance could not practically be watered, another circumstance doubtless fraught with certain injurious results, though to what extent is difficult to say. The annexed table will shew the cost, very nearly, of each tree respectively.

COST OF TRANSPLANTING.

Species of Trees.	Height of Trees.	Age of Tree since 2 ft. high.	Number of times removed in Nursery before transpl.	Distance of carriage for transpl.	Cost of pitting and planting.	Cost of Protection.	Value of Tree, carriage included.	Total cost of each Tree.
	ft.	years.	times.	miles.	s. d.	s. d.	s. d.	s. d.
Lime..........	12	10	5	6	1 0	1 4	6 0	8 4
Oak............	8	5	1	6	0 9	1 4	2 0	2 9
H. Chestnut..	9	5	1	5	0 9	1 4	2 6	3 3
B. I. Poplar..	5	2	0	15	0 6	1 4	0 8	1 2
Sycamore.....	12	6	1	5	0 9	1 4	3 6	4 3
Spruce.........	3	1	1	5	0 3	1 4	0 9	1 0

Throughout the district other planting was performed about the same time as this was. In a corner of a field the writer planted a small group of trees, composed of oak 8 feet high, spruce 3 feet high, and black Italian poplar from 5 to 6 feet high. At the present time the oaks are only a few inches higher than when planted; the spruces are about twice the height they were when planted; while the black Italian poplars are from 15 to 20 feet in height, and proportionably thick of stem, and producing altogether a very imposing aspect, attained within a very few years. The soil is loose, dark, and damp, with a subsoil equally damp and stony. On observing the poplar flourishing and growing so well in so short a time; furnishing and beautifying a place recently tame and bare, and where other trees refuse to grow even moderately well, this case furnishes an encouraging example for others to imitate, who may wish to clothe and beautify a district quickly, and at moderate expense. This may be done, also, even in a park or near a mansion by planting amongst the [illegible] other [illegible] duration [illegible] after the poplars are cut down [illegible] removed.

During last spring, the writer lifted and removed above 200 large hardwood trees of various [illegible] trees were dug round for lifting during the previous winter and spring, and were transplanted in March and April following. At the same time that the trees were dug round preparatory to transplanting, their tops were all considerably reduced, which has a very beneficial effect in preventing the trees from blowing down with the wind, which they are very liable to do if at all top-heavy or exposed. Though compelled by circumstances to prune the tops of the trees in winter or spring, the fact must not be overlooked that August and September is a much preferable time of the year for doing the work. By pruning at the latter season there is no danger of weakening the tree by profuse bleeding, a result hurtful to all trees, but especially so to sycamore. The trees were mostly conveyed fully a mile to their new destination, the smallest of them in carts, placed in various positions to suit circumstances. Though the most favourable position to cart them in is an upright one, but want of head-room, from trees overhanging the roadways, and other obstructions, they had frequently to be placed horizontally. The largest of the trees were conveyed upon a janker, which was specially fitted up for the purpose. Only one tree was conveyed upon it at a time, and one or two horses drawing it, according as required. The difficulties to contend with in removing trees upon a janker are the infliction of injuries by bruising and displacing the bark, and also disengaging the earth from the roots. Where the ball of earth was large, it was necessary to place a strong low carriage underneath it, with wheels about a foot diameter. This prevents the earth from shaking off, and the roots from injury. The end of the pole of the janker upon which the root and trunk of the tree rests being bound with iron, is apt to gall the bark; hence it requires careful stuffing with mats, or other soft substances, which entirely prevents the injury from occurring. The results of the whole planting, notwithstanding the excessively dry season, have been most satisfactory and successful. Only about seven per cent. of the trees planted have perished, and these were chiefly beech and Turkey oak. The latter, in the writer's experience, is by far the most difficult of all forest trees to transplant.

Notwithstanding the amount of labour and expense attending this system of planting, it is probably the cheapest way of raising hedgerow trees, of beautifying the landscape, or affording shelter to stock, and will be found to bear a favourable comparison, in point of expense, with that of growing trees in any other way. The losses that attend the transplantation of large trees very little, if at all, exceeds that of planting small ones.

The writer is so fully persuaded of the advantages, pecuniary and otherwise, arising from transplanting trees from 15 to 25 feet over that of planting small ones, that in thinning hardwood plantations he never cuts down trees that are suitable for transplanting. Upon all such trees he puts a special mark, known to the woodmen, who leave them at the time of thinning, and afterwards, when convenient, they are dug round and top-pruned, and are thus ready when required for transplanting out.

After planting large trees, it is imperative to support them in some way or other against the prevailing winds. This is done in various ways, sometimes by means of stakes and bars of paling; sometimes by mooring them with strand and cable wire, and posts driven in the ground at proper distances from the trees; sometimes they are efficiently supported by laying a few large stones around the base upon the roots. In the writer's experience, it is always necessary to adopt some means of support. His preferred system of planting renders this imperative, as he always places the tree in the ground with the roots in an elevated position, somewhat above the ordinary level of the ground, so as to encourage them to run upon the surface, a circumstance possessing many special advantages. The practice of deep planting is one of the most hurtful that can be adopted, and is always sooner or later followed by baneful results. Considerable difficulty is often experienced in watering trees, to induce the water to penetrate the surface, which becomes caked and hardened after repeated waterings. To facilitate the absorption of the water it is often advisable to perforate the surface of the ground with a sharp iron instrument or foot-pick; as this practice, however, is often attended with results injurious to the roots by cutting and bruising them, it is safer and, in some other respects, better to insert pipe tiles in the ground, the upper end level with surface. The water when poured into tiles, soon finds its way to the extremity of the roots. Of all others, the most economic and efficient method of watering appears to be to leave the surface of the ground, at a short distance from the tree, in a depressed or concave form. The water thus rests in the cavity till it sinks down upon the extremities of the roots. It is sometimes asked, what is considered a fair and sufficient watering when the ground is considerably dry? One gallon of water to a cubic foot of earth may be considered a fair allowance—*e. g.*, if the roots are 2 feet deep for every square foot of surface of ground over which they extend, 2 gallons of water are required.

In selecting hardwood trees for transplanting, such only should be taken as have a perfectly healthy appearance. In healthy trees, the juices circulate freely, and possess inherent powers of healing, which is of vital importance in case of injuries having been inflicted on the roots, trunk, or branches. A thick fleshy bark, broad leaf, and rich colour, are all important indices, and worthy of reliance in selecting trees.

In December last, the writer planted a number of hardwood trees from 10 to 15 feet high, which remained without supports for some time subsequent to planting. The weather was boisterous at the time and the wind shook the trees severely, producing around them, by friction, a hole in the earth that admitted water which afterwards became frozen, and the hardened surface of the hole proved very injurious by rubbing the bark at the necks of the trees. In a short time, if attention had not been paid to the circumstance, the trees would have been completely destroyed; as it was, they received considerable injury from which a salutary and precautionary lesson may be learned.

In 1853 the writer assisted in transplanting a group of trees around a newly-built cottage. The group consisted of oak, spruce, and Scots pine, together with some shrubs. The soil was a deep sandy loam, resting upon white sand and clay, at a depth of about 3 feet. The trees were grown in a reserve nursery about a mile distant from the place, and were conveyed thither in carts. Most of the trees were lifted with balls of earth attached, and were from 6 to 8 feet high. It was observable, from the time of planting, how well some of the trees grew, making large annual shoots, while others enjoying the same advantages, made no perceptible progress. The circumstance was so peculiar as to call forth special attention and examination of the roots of the trees, and it was found on exposing the roots, that those trees which were progressing favourably had been planted with balls of earth, while those of stinted growth had, through accident, lost their balls entirely, which explained and accounted for the discrepancy of growth. Those trees transplanted with the ball of earth attached continued to grow in their new situation as if they had never been removed or disturbed at all; the others, on the contrary, found it hard to produce a fresh class of roots, adapted to their new sphere of life. From the above and similar circumstances, the writer is persuaded that oaks or other trees planted from clay soils are very uncertain of success, and would [illegible] seek to guard against such consequences in transplanting.

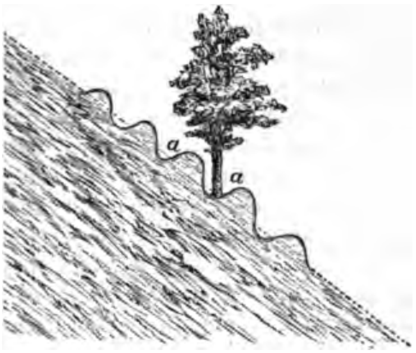
In an advanced nursery known to the writer, a number of oaks stood, whose slow growth attracted his attention, and, anxious to know the cause had some of them dug up, when he found that at last removal the roots had been considerably cut. The soil of the nursery is a somewhat retentive clay, and such as oaks, at first, do not succeed in. From this it must appear very essential to the welfare of trees, but especially to oaks, that no mutilation of the roots should take place, or be in any way unduly shortened or deprived of their fibres.

From the above and other instances which the writer could adduce, it appears that oaks, if transplanted from a clay soil without balls of earth attached, are very uncertain of success. Even small oaks, unless specially attended to in the nursery, by way of encouraging fibrous roots, are in all cases precarious to transplant.

CONIFERÆ.

Owing to the naturally constitutional difference between coniferæ and hardwood trees generally, it becomes necessary to treat them differently, each according to the laws which regulate their health.

The writer has found greater difficulty in successfully transplanting pine trees than hardwoods; this difficulty arising chiefly from the treacherous nature of the juices. A slight accident disarranges their sap vessels, the resin of the tree crystallizes and obstructs the canals, and sooner or later causes the life-spring to cease. Last spring the writer transplanted a number of pines and firs, which had stood several years in a shrubbery. They had numerous roots, but on lifting them, owing to the loose nature of the soil, the clay all dropped off, leaving them quite bare. Some of them were pruned by shortening their side branches, but none of their tops were interfered with; this was done by way of making an experiment to see if the effects were favourable,as in the case of hardwoods. In consequence of the severe drought of the summer they were all alike duly watered, but for which they would probably all have perished. About one-half of those trees that were pruned died in the course of the season; while only about one-third of those that were not pruned died. The above trees were planted upon a considerable incline, and upon sandy ıvelly soil, and owing to the incline of und, watering efficiently was very diffi- perform, in consequence of its running ›re it had time to sink into the soil. To t this, the surface of the ground was ıcave a little above and a little below n of the tree, as shewn in the annexed —*a a* are cavities for the water which



.lly sinks down upon the extremities of ›ts. When once the tree is fairly esta- l beyond the requirement of artificial ıg, the ground may be levelled up and over. In the writer's opinion the exces- ·ought of summer, entire want of ball of ıt root, together with the hard gravelly of the soil in which they were trans- d, had a much greater influence in causing ıth of the trees alluded to than the prun- he unlevel surface of the ground thus pro- is objected to on account of its unsightly ·ance; but when the trees are fairly shed beyond the requirement of arti- vatering, the depressions of the ground ed up, and the whole rendered smooth ·vel. Pruning in the above instance btedly proved injurious, and other cir- ınces could be adduced corroborative h results; but how far cutting off the pine trees of larger growth might affect s difficult to say. One circumstance e quoted as worthy of notice. In seve- ıe plantations known to the writer, the had their tops broken off from the of squirrels peeling the bark. The tops roken off generally left a portion of live ıes upon the trunk, which branches not only survived, but increased in vigour. The writer has seen even one small branch upon a Scotch pine sufficient to keep the trunk alive, growing, and healthy.

In 1858 the writer had a number of spruces lifted and transplanted which were dug round preparatory to transplanting the year before. They were from 6 to 9 feet high when lifted, and were in a very rapid state of growth, making annually top shoots from 18 to 24 inches. On examination of the trees five years afterwards, the writer was considerably disappointed at their condition. Though all alive, not one of them was growing fast, the greater number making top shoots only from 5 to 8 inches, while the foliage was poor and of a light colour. The only assignable cause for the falling off of growth may be ascribed to having grown originally in a soft spongy soil approaching to moss, and their roots, being formed suitable for that situation were not at all adapted to their new one, they having, as it were, acquired a sort of aquatic habit; and having now no further means of sustaining themselves, relapsed into their present languishing state.

From the above, and other instances that might be cited, it appears absolutely necessary that due regard should be paid to the food a plant is originally accustomed to, so that in transplanting it to a new situation a similar provision shall be made for it. Allowance also should be made for any adverse change or influence that may be brought to bear against the plant. It should, for a time at least, have better food than previously accustomed to, to make up for the other means of support so unfavourably altered.

Larch trees of large size are difficult successfully to transplant, especially those of rapid growth. In making selection, where choice can be made, preference should be given to those of slow growth, provided only they be sound and healthy. In transplanting larch, it should be done only a few days before the bud begins to break, and the soil should be dry, pure, light, and open; they should also be lifted with balls of earth, as without such provision, failure is all but certain. In dry weather, and especially in ar they should be regularly and duly watered for at least three seasons subsequent to transplanting.

In the vicinity of Edinburgh, a few years ago, the writer had his attention directed to a portion of a nursery planted with Cedrus deodara. The plants were from 4 to 8 feet high, and transplanted early in the spring. About one-half of the plants presented a very favourable appearance, the others quite the reverse. The ground was all much alike, the plants all of the same stock, and the work of planting done at the same time. The cause of failure in the one case was explained as caused by the earth ball being broken and the earth shaken from the roots of the plants, which was done intentionally, and with the view of encouraging root growth. Those which succeeded, and without any deaths occurring, were lifted carefully, and planted with the earth adhering. No better or stronger proof than this can be adduced to shew the importance of preserving the earth about the roots of such plants in the act of removing them.

In 1857 the writer transplanted large coniferæ rather extensively and successfully by adopting the following method: Where the plants were found to have earth balls adhering to them, they were simply transplanted without other auxiliary, but in all cases where the earth fell off the roots in performing the work, he planted them in leaves, at same time administering water freely. During the same season, in the month of June, it became necessary to remove several pines and large shrubs. In performing the work, the earth was entirely disengaged from their roots. They were, however, all planted in leaves as above, and none of them died. During the past summer the writer had occasion, in the month of July, to lift 60 silver firs, from 10 to [illegible] feet [illegible] in a heap of [illegible] without any other [illegible]ion they [illegible] and grew except two of them, which [illegible] roots severely mutilated. The [illegible] the preservation of these trees was all the more wonderful, considering that they were removed without almost any earth adhering to them, and at a time and season so remarkable for its excessive heat and drought that thousands of plants which had long been established in the ground withered and died. Even some of the silver firs referred to were at the time of removal suffering considerably from the effects of the drought, but on removal have recovered, and are at present growing and healthy.

Another circumstance connected with planting in leaves is worthy of notice. In a reserve nursery, a number of trees, from 6 to 8 feet high, were lifted for the purpose of transplanting, but, being overgrown, the best only were selected and the others cast away, being carelessly thrown over the fence as useless. A quantity of leaves accumulated about the roots of the plants thrown away, which induced them to strike root, and they were found afterwards in a better state of health, making more rapid growths than those which were carefully taken up and planted with skill and attention. This is another proof of the power and virtue which leaves possess of encouraging and producing root growth, their chief virtue probably consisting in the moisture they retain and food they afford to the roots of the plants.

Various means are adopted to impart stability to trees newly transplanted. As such are frequently objects of fancy and taste, it is desirable that the means adopted for the purpose should also be such as will please the taste and fancy of those having pleasure in them. However well a tree may be planted and look, its beauty is greatly marred if surrounded by an inappropriate object. As the means of supporting trees are so great and varied, it would be out of place here to attempt to describe them; hence, a passing notice is all that can be afforded. For large trees moorings are often constructed of strand wire, and posts driven into the ground, as a very efficient protection. For smaller trees, posts and rails may be used in various ways, according to taste and circumstances. Stones are also made use of, by laying them around the base of the tree; and were it not for their objectionable appear

y are probably of all others the best
s.

GENERAL CONCLUSIONS.

g already extended the subject
splanting beyond the prescribed
e writer will briefly conclude by
the following supplementary remarks.
selecting hardwood trees for trans-
, it is desirable to take them from a
a lower altitude, from a poorer to a
il, from loam to clay, from an open
; from a cold soil to a warmer one,
n exposure to shelter. These con-
pply more to the future success than
mediate growth of the plants. That
and habit of the tree should be duly
l in making selection, choice should
of such only as are of free but not
t growth, having a clear fleshy bark,
well-developed buds. Of the gummy
trees, those should be preferred that
gummy, and those of resinous buds
uds are most resinous. It is better
t those trees which have numerous
anches, with stem thick at the base,
lually tapering towards the top, with
s diverging from the tree horizontally,
those whose branches are vertically
. In selecting pines for transplant-
ice should be made of such as are of
w growth, stems straight, and uni-
pering from base to top, and clothed
her slender branches, clean healthy
h, and generally dark foliage. In
spects the same conditions are appli-
for hardwoods. As the larch differs
y in its growth from both hardwoods
es, it requires different treatment.
it differs most widely is in its im-
of confinement, both in respect to
d branches. How far the larch will
o pruning, so that when transplanted
nce of growth may be so maintained
roots may be able to sustain the tree,
writer, a matter still of uncertainty.
tting off lateral branches, and even
ver the stem to within a few inches
ound, is attended with no injurious
ut often the reverse, the writer can
nd in corroboration of this statement
it is only necessary to look into a young larch plantation, where hares have eaten over part of the larches. Those trees so eaten not only survive while others die, but in two or three years, if not eaten a second time, are stronger and further advanced than those not eaten. In preparing trees for transplanting, a trench should be dug around them, describing a circle somewhat within that of the outer branches of the tree. The trench should be made sufficiently deep to cut all the roots, and then filled in with earth, fresh and richer, if possible, than that dug out. After being dug round, the tree should be allowed to remain one, two, or three years, according to circumstances, when it will be fit for removal; but if not removed at the end of three years, a second digging will be found necessary, and should be done in such a way as to keep clear of the last-formed trench, or inner edge of the former trench, and avoid taking off the new-formed fibres. When the circle described around the roots is necessarily too small compared with the spread of the branches, the latter should be reduced in due proportion, otherwise the roots will be unable to nourish the whole tree. Digging round and preparing of the roots, should be done in spring, while pruning the top should be performed in autumn, at least one year previous to transplanting. In consequence of the unavoidable disengagement of earth from the roots of the trees in the process of transplanting, a necessity is thus induced of artificially aiding them in obtaining sufficient nourishment in their new situation; and as the food of trees is only absorbed in a soluble state, this must be done by duly watering them. Moist leaves, with a sprinkling of sand amongst them, are probably the best ingredients as food to apply to a newly-transplanted tree. When it is found necessary to form depressions in the ground for the purpose of watering the plants, it should be done about half distance between the stem of the tree and the extremities of its roots. In preparing the pits for receiving the trees, they should be made one-third larger than the ball of the roots which is to fill them. The subsoil also should be loosened for a considerable depth; and when stagnant

water occurs in the bottom, a stone or tile drain should be introduced to carry it off. September and October are the best months of the year for transplanting trees generally, but April and May have certain advantages for transplanting evergreens, though not so great as September. The expediency of reversing the position of trees in their new situation, such as placing the seaward side landward, or *vice versa*, is a questionable practice. The benefits arising from it are more than counteracted by the injurious results, which results would require a somewhat lengthened physiological explanation, which want of space precludes. The art of transplanting is now much less obscure and mysterious than in former days, yet much has to be learned in order to obtain definite results and success. In the act of transplanting where watering is required, it is better to pulverize the earth, and fill the pit with it while dry and loose, and afterwards thoroughly saturate it with water, which is better than by beating or tramping the earth. In substituting fresh earth for that taken out of the trench, in order to introduce that which is most adhesive for removal, it should be composed of turf mould taken from a clay soil, and well mixed with leaves or other fibrous substances which adhere to the roots.

The Stable.

GH LEAVES FROM THE NOTE-BOOK OF A VETERINARY SURGEON.

VI.—INFLAMMATION OF THE KIDNEYS —*continued.*

IESE may be passed over, as it is not asy to elucidate any symptoms known, life, that could tell us that they were ncipal seat of ailment. In *post-mortem* iations, I have seen both very much en- and diseased. I remember a case in the animal (a feeding bullock) died ly. The former was found ruptured, morrhage causing death. The liver o much enlarged, full of black blood; od-vessels of the intestines, &c., the lungs also. The animal was feeding 1 fact, by far too rapidly—and receiving ck by an occasional dose of physic, or ing restricted in feeding. It was l to graze some hours every day, so ad the spleen not been ruptured, a and acute attack of general inflam- would have carried the animal off in a ırs. Such is the effect of the forcing , or too rapidly feeding, and not taking per precautions. Such a case happens : any premonitory symptoms whatever. ame remark applies to the diseases as blackleg, joint-felon, quarter-ill, n which general inflammation or latory fever is present. These ıfter the acute stage is somewhat to settle down in one of the legs ırter—hence the name. This in- latory fever gives not the slightest ; of its approach, unless in this, that mal has been doing better than his ours—feeding too rapidly. The ani- en seen at night may be grazing, and ppearance in its usual health, and in rning be found standing by himself, ıg laboriously, the head pointing straight out, with the mouth gaping open as if to help in getting more breath, eyes protruding, very red, and swollen, heaving at the flanks, with pulse quickened, but more full than one finds it in acute inflammation generally, although hard, but not that thin hard wiry feel. The animal cannot be got to move, and, if forced, can hardly do so from lameness in the hind or fore extremities or quarters, keeps staggering as if about to fall; on rubbing the hand down, the affected limb crackles as if emphysematous, or as if full of wind between the skin and flesh. If the animal lies down it jumps up suddenly, gasping for breath, as if that position would completely choke him. If no relief is obtained, these symptoms increase, and the animal is dead in a few hours. From the *post-mortem* appearances we might call this disease a general congested inflammation, for there is much congestion of the blood-vessels, especially the veins all over the animal; the lungs, liver, spleen, all seem ready to burst from being so much congested; the limbs, where there is lameness, black, putrid, as if mortification had already taken place; stomachs and intestines in similar state, less or more. The treatment is plain here—blood-letting, and that to its fullest extent, until the animal is ready to faint; the blood is very black and thick, so that a large phleme or lancet is necessary. I may here remark that whenever I saw scarlet-coloured blood of a thinner consistence coming away, or running through the black thick blood, I was always sure of my patient; in fact, I always extended my bleeding until that result took place, then I was safe. Of course, if such did not take place, I knew the animal must go, and that very quickly. Physic is the next conside tion. A full dose and a-half of the usual purgative, adding croton oil, 15 to 20 drops, or of the powdered bean, 15 to 20 grains. After the medicine is given, and the animal is a little recovered from the first bleeding, if necessary, repeat the same until you observe the change of colour, as I have said above. Then follow up, every six or eight hours, with half or quarter doses of the purgative until the bowels are freely opened. I have bled in such cases three times, as much as the animal would bear, before having the desired effect, or before I could even get him to walk towards home. Insert large setons in the brisket well smeared with blister ointment; or, if it can be got handy, black hellebore root makes in this case a capital seton. When the bowels are well opened, if considered at all necessary, you may give the following sedative or fever draught:—Sulphur, 1 to 2 oz.; camphor, 1 to 2 drachms; rubbed down with a little spirit nitre, ½ oz.; tartar emetic, 1 drachm. This done, the animal soon begins to amend, and if there should be any apparent debility, be very careful in giving tonics, unless the animal is very weak and shews no inclination for food: then give camomile tea, ½ oz. of gentian, ½ oz. of ginger, divided in two doses, and given twice a day in a pint of good sound ale or porter. I need not say anything as regards the necessary means to prevent these diseases, as they tell it themselves. Some of my employers, before turning their young stock on rather better pasture, had them all bled, physicked, and setoned in order to prevent nflammatory fever, for if not taking this precaution they were sure to lose some of them. The preceding remarks on diseases of the digestive organs are the results of many years' practice. If somewhat abridged, there are warnings here and there given sufficiently or the farmer to keep clear of heavy losses, f he will only make the necessary observations amongst his stock, and give the time and trouble required, which is not great, nor the means expensive.

As supplementary to our notes, the following recipes may be of use:—

Purgative Draughts.—No. 1. Epsom salts, 12 ounces; flour of sulphur, 4 ounces; powdered ginger, ¼ ounce, dissolved in a pint and a-half of boiling water, or in some cases good sound ale may be used. For instance, when an animal is off feeding somewhat, does not ruminate so regularly, is languid, dull, hangs the head, is not inclined to move about, lays down but little, pulse natural, but rather weak, feeble; ears, legs, and horns natural temperature; the fæces hardish, a black outward hard skin, which, when broke, shews underneath the fæces somewhat thinner, but very dark. Such symptoms, I think, have been already alluded to as the commencement of pure inflammation of omassum, or maniplies. I have found the stimulating properties of the ale in the above cases very beneficial, and in twelve hours, if the bowels are not responding, give another half-dose, and so on. I may here remark that in all cases never omit the ginger. Even in acute inflammation half the quantity may be given, for if the bowels are not well opened the disease will soon run its course. 2. Linseed oil, 1 to 1½ pint; 3. Castor oil, 1 to 1½ pint; 4. Common salt, 1 to 1½ lb. For calves — No. 1, according to age, 2 to 4 ounces; No. 2 and 3, according to age, 2 to 4 ounces. In obstinate cases of constipation, or when quick action is necessary, add to No. 1 — 5. Powdered croton nut—*i.e.*, seed—10 to 15 grains; croton oil, 15 to 20 drops. In some cases, where a considerable quantity of medicine has been given, and no response, a pint of yeast—*i.e.*, barm—has been given, and in a few hours after, the bowels have responded, whether owing to the barm or not I will not undertake to say. Such is the fact. I have also given—No. 6—cream of tartar, 4 ounces.

Alterative or Fever Draughts.—Rubbed down with a little spirits of any kind—gin, whisky, &c.—gum camphor, 1 to 2 drachms; powdered nitre, 4 drachms; powdered digitalis, ½ to 1 drachm; tartar emetic, 1 to 2 drachms; extract belladona, 1 to 2 drachms; acetated liquor of ammonia, 2 to 4 oz.; rub the extract down in a little water first, add to the other, and mix in gruel or boiling water. Camomile tea was a favourite of mine as a dissolvent, and feverfew tea also; and often I used them instead of water for dissolving No. 1 purgative, and, when it could be readily got, always used either of them instead of water, to be given once, twice, or thrice a-day, according to the severity of the case.

Astringent Draught.—Prepared chalk, 1 to 2 oz.; extract of catechu, 1 to 2 drachms; pulv. opium, 1 to 2 drachms; or the tincture of opium, 1 to 2 oz.; rub down the powders in a little water, then mix in ¼, ½, or 1 lb. of starch, made in the usual way as gruel.

Tonic and Astringent, slightly, No. 1.—Sulphate of copper, ¼ to 1 oz.; or the sulphate of iron, ¼ to 1 oz.; pulv. gentian, ½ to 1 oz.; pulv. ginger, ¼ to 1 oz.; given once, twice, or three times a-day, dissolved in ale, porter, or water, or camomile tea. No. 2.—Quinine, 1 to 2 drachms; sulphuric acid (vitriol), 1 to 2 drachms; in a pint of cold water, rub down the salt with the acid.

Stimulant Draught.—No. 1. Carbonate of ammonia, ½ to 1 oz.. I have given the above in obstinate cases of constipation with purgative No. 1, even when hardly admissible, but with good effect. No. 2. Aromatic spirit of ammonia, 2 to 4 oz., mixed in a pint or a pint and a half of water; very useful in hoven.

Antispasmodic Draught.—Oil of turpentine, 2 to 4 oz.; linseed oil, ½ to 1 pint; very useful in hoven, colic, or spasms. I have not enumerated the whole of the medicines in general use, as I think what has been given is all that is necessary for the grazier, &c., to have beside him.

No farm-house ought to be without a quantity of No. 1 purgative, especially also the following narcotics and anodynes:—Powdered opium, or the tincture; extract of belladona. When giving the belladona, give it along with the acetated liquor of ammonia, as before stated.

A NEW PROCESS FOR MANUFACTURING HORSE-SHOES BY MACHINERY.

A NEW process for manufacturing horse-shoes by machinery by means of the hydraulic press, recently invented and patented by Mr Bastien, civil engineer, Paris, has been brought under our notice by Mr St Clair Massia, of Birmingham, who, we understand, is specially intrusted with the disposal of the patent-right for the United Kingdom. The advantages of this system of producing such an important everyday article of commerce as the horse-shoe are its complete efficiency and economy of production. The latter may, indeed, be accomplished with marvellous rapidity, one machine being capable of manufacturing from 7 to 9 tons of completely finished horse-shoes, averaging 2 lb. weight each, in a working day of ten hours. The process itself is thus described: immediately the bar comes red-hot from the furnace, the iron is placed either by hand or machinery, as may be preferred, in the rolling mill. Here a moveable piece on which the bar is placed receives an alternative motio from two pistons of the hydraulic pres This moveable piece presses the bar betwee two left-hand sliding surfaces, which impa to it a bend. It next meets with a die, o which it is very strongly pressed, and thus receives the definite shape, while at the same tim the nail-holes are pierced, and by means of spring the moveable piece recedes and allow the finished shoe to fall out into a shallow tan of water placed underneath. The action o the machine suffices to make a shoe at eac motion—forward and back. The dies an stamps are easy of adjustment, and may be immediately exchanged for the production o larger or smaller shoes, at discretion. Two pressures are necessary—namely, one of from fou to five atmospheres, to produce the form of th shoe; and a second of from 100 to 150 atmospheres, to pierce the nail-holes. The latt pressure necessitates the supply of but a sma volume of water, as this very strong pressure merely required over a surface of 2 centimetres at the most. A movement of from six to eight strokes per minute can easily be attained by the machine, thus producing as many shoes as strokes. It will be seen from this brief description how invaluable is Mr Bastien's invention—the shoes being turned out of one uniform shape and thickness, which is utterly impossible in what is facetiously termed the . . . . and indeed all other hand-made shoes. It will, moreover, give any ironmaster who may avail himself of this patent a chance of getting a better price for his horse-shoe bars, by simply turning out horse-shoes instead of the iron of which they are manufactured. We understand the system has already been successfully adopted in France, the horses belonging to the Paris omnibus companies having been shod with shoes of this make.

We reproduce this notice from the *Ironmongers' Journal and British Metal Wares Review*, without any intention of offering our opinion on the particular process announced for manufacturing horse shoes, beyond stating that, so far as we can judge by reading the notice, for we have not seen the shoes, there is a show of consistency and probable usefulness in the process.

There is no puff and pretension to produce shoes which will obviate all the evils incidental to bad shoeing—almost proof that the parties so puffing either know nothing about the matter, or, knowing a little, set themselves up as impostors. This announcement simply tells us that good shoes can be produced by machinery (not necessarily better than hand-made, or otherwise novel); and if machinery can be made to supersede hand work, and do almost as well the most laborious part in the process of shoeing, leaving the skilled farrier to do the shoeing in all essential details, a great step will be attained. It is an ironmonger's, and not a horse-shoe producing question, and if kept distinct from the technical art of horse-shoeing, as all such aims should, it may, no doubt, be worked to public advantage.

While adopting the notice, and wishing success to the scheme, we shall not conceal the fact that hitherto all attempts to bring machinery to bear usefully on the art of horse-shoeing have failed; and mainly because too much has been aimed at and pretended, while the work required has not been defined or understood.

The shoes must be made of good bar iron, of proper form and substance for all classes of horses, for their respective employments; and good shoes can be as easily made as bad, and hands, with the guidance of knowledge of the art, will complete the process, and the result be good shoeing. While desirous of witnessing the possible achievement of this scheme in accordance with the announcement we shall not be sanguine beforehand; nor do we expect to see any machine-made horse shoes surpass the best hand-forged shoes: Economy of labour is the great desideratum with practical good results in the work.

The Dairy and Poultry-Yard.

RICAN DAIRY FACTORIES—THEIR ARRANGEMENT AND MANAGEMENT.

NO. II.

g. 3, we give the ground-plan of the ockville factory. The factory stands adjoining a wet and springy piece of covered with fragments of rock from wangunk mountains. The buildings ected a year ago, and have some im- ents in construction over the older s. The main structure is 25 feet by — two storeys — which are used for cturing and curing cheese. Adjoining one end is the spring-room, and on the side running back in the shape of *L* is the churn-room, 20 by 30 feet. On the end of the churn-room is the ice-house, which is arranged so as to lead out of the churn-room with a broad hall or alley, which serves as a cellar for storing butter.

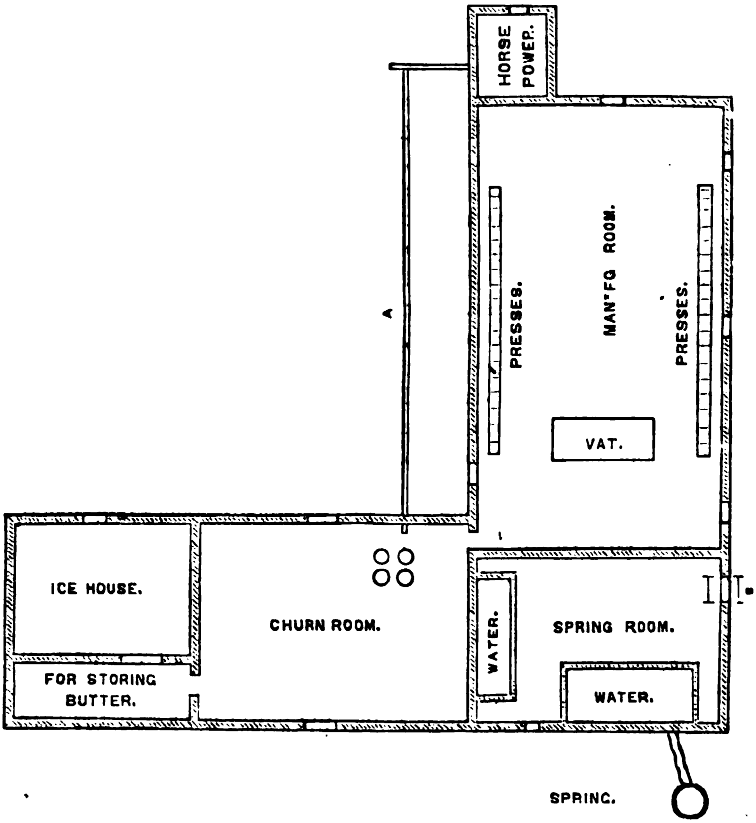


Fig. 3.

This hall has double sides, packed in with tan-bark; and the ice-house being on one side, with communication by door, makes it a cool and nice place for keeping butter or cream in summer. In the spring-room there are two vats—one 9 feet by 12 feet, and t other 8 feet by 12 feet, sunk even with the floor, and arranged so as to be filled from one spring. The temperature of the water is 48°. It is soft water, but less so than those at the other factories to which we have referred. The delivery of the milk is at a window, and on a platform the height of a waggon. As the teams drive up, the cans are slid upon the platform, and emptied into a large square receiving-butt or can of tin inside of the window, standing upon platform scales, where it is weighed, and then conducted out by two faucets into the long tin pails or coolers. The cost of structure and fixtures was £3000. The number of cows from which milk is delivered is 425, and on November 1st the receipts were 1800 quarts—estimating a quart, wine measure, to weigh 2 lb. Milk varies in weight, and a wine quart weighs, at some seasons of the year, a trifle over 2 lb. During the month of May, when cows are in pasture, Mr Slaughter finds that 100 quarts, wine measure, will weigh 211 lb. The milk here is kept in the spring from twenty-four to thirty-six hours, when the cream is taken off and allowed to sour, and then churned. Mr Uptegrove, the superintendent of the factory, informed us that about one-tenth more butter is obtained from the cream when churned sour than when sweet. At this season of the year (November 2), the cream is taken off and deposited in the long tin pails, and immediately carried to the churn-room, which is kept, by means of a coal stove, at a temperature of 60° to 65°. Cream two days old when taken off will require from two to three days before it will thicken in the churn room at the above temperature.

Butter-making.—The churns are the barrel and half dash churn, and are filled about half [illegible] which is dilut[illegible] [illegible] putting [illegible] it the [illegible] The temperature of the cream in summer, when the churns are started is about 60° but in cold weather they are started at about 64°. When a mass of cream is to be churned, the churns are filled about half full, and a pail of spring water added to dilute the cream; in warm weather cold water is used, and in cold weather warm water, so as to make the mass at a temperature of 60° to 62°. The temperature of the cream while churning should be kept below 65°, for if at the close of the churning the buttermilk should be at a temperature above 64°, the flavour and colour of the butter are injured. When the butter begins to come, the churn is rinsed down with cold water. After the butter is taken from the churn, care is taken not to touch it more than is necessary with the hands. The butter trays are eliptical in shape, and the ladle is used for turning over the butter while it is being washed. In salting and working over, the whole is done by the butter worker heretofore described, and great care is taken not to work it too much, as over working spoils the grain and makes the butter slobby. A 22 lb. batch is laid upon the inclined slab or butter worker, and the lever applied, first beginning at one side, until the whole is gone over. Only a few manipulations of this kind are required, and we were surprised at the expedition by which this part of the process was effected. The salting and working of the butter is by the same rule adopted by the other factories, 18 oz. of salt being used for 22 lb. of butter.

The butter worker is similar to the one alluded to, except that the lever is diamond-shaped, which it is claimed is an improvement. The inclined triangular on which the butter is worked stands upon legs, and has bevelled sides about 3 inches high. It is 4 feet long and 25 inches wide at the upper end, tapering down to 5 inches at the lower end. At this point there is an opening for the escape of the buttermilk into a pail below. In salting, the butter is washed and then spread out with the ladle upon the worker, and pure fine Ashton salt sprinkled over the mass. It is then turned over a little with the ladle, and afterwards worked with the lever.

At this factory there was a little contrivance, consisting of a wheel and lever and weight, for regulating the stroke of the dashers when churning. The trays are eliptical, being 2½ feet long and 1½ feet across, and will hold

lb. of butter. The butter is packed in
ange county pails or tubs holding 60 lb.,
in oak firkins of 80 lb., as at the other
tories, and shipped twice a week to New
rk, bringing 70 cents per lb. The associa-
n is composed of twenty-eight farmers, who
ve dairies running from five to ten, and up
thirty cows. Four farmers not belonging
the association deliver milk here, and are
rged $1.50 per cow extra.

The cheese is manufactured out of skimmed
lk, by the same process as at the other fac-
ies. They are pressed in 16-inch hoops,
nches high, and weigh about 35 lb. each.
e 1800 quarts of milk received per day at
s season of the year, after the cream has
en taken off, will make nice skimmed-milk
eese.

Labour employed.—Besides the superinten-
nt, three hands are employed at the factory
two men and one woman. The butter-
ker and his wife, 50 dols. per month, find
mselves in board, &c.; the remaining hands
20 dols. per month, and board. At all
se factories Ralph's Oneider vat is in use
cheese-making, and gives universal satis-
tion.

Ve have now laid before our readers the
inge county system of conducting the
ry, and believe it affords valuable sugges-
ns to the dairymen of the central counties.
dairy men will read this article attentively,
y cannot fail to see that, as far as profits
de by this system than by making cheese
ne. The establishment of butter factories
s not wholly concern the farmer, and could
mited number be set in operation through-
the central counties, the public would be
atly benefited, since good butter then
ld at all times be had.

Old notions exploded. —We have been
ght to believe that cream cannot make its
y through deep milk; that the milk must
set in very shallow pans, in order to obtain
best result, together with other points,
ich we are assured by the butter makers of
nge county, are mere traditionary fables,
ing no foundation in fact. We are not
pared to give an opinion in the matter; or
at least we do not choose to express it just now, but hope the suggestions thrown out in this paper will lead some of our farmers to experiment a little more in milk, with a view to satisfying themselves of the real facts in the case.

Advantages of this system. — It will be readily seen that the advantages of this system in conducting the dairy are very great. Large profits are realized by the farmer, since the milk is more thoroughly worked up, and with less loss, while, at the same time, the butter product will bring from three to four times more than it would if made into cheese. Good butter is needed, and will readily sell for a high price in all our cities. We are opening up another market for cheese, by furnishing the kind that will keep well on long voyages and in hot climates, and of the precise character demanded by the people of those climates.

Factories of this kind should be put in operation in every county, at least a half-dozen or more, in order to supply the home demand for good butter. The plan works well in Orange county, where there are already established some fifteen factories; and we are satisfied, after thoroughly looking over the ground in both districts, that, with proper care and attention, as good butter can be made in the central counties as elsewhere.

NO. III.

The design in figs. 3 and 4 is that of Mr Maples, well known to have paid some attention to cheese manufactories, and the improvement of dairy apparatus for a cheese factory and cheese-curing rooms.

The plan is put forth, not so much with the view of giving a *model*, as offering suggestions which may call out improvement in this direction. So far there has been very little attention given to cheese-curing rooms, though it has been well understood that vast quantities of cheese are injured in flavour annually on account of imperfect curing.

The "dry house" should be so constructed as to preserve an even temperature, and in the plan presented this feature is sought to be effected. The arrangement of rooms, &c., is in some respects not without merit; and, while imperfections will, doubtless, be seen, the design may probably assist those contemplating building factories to some

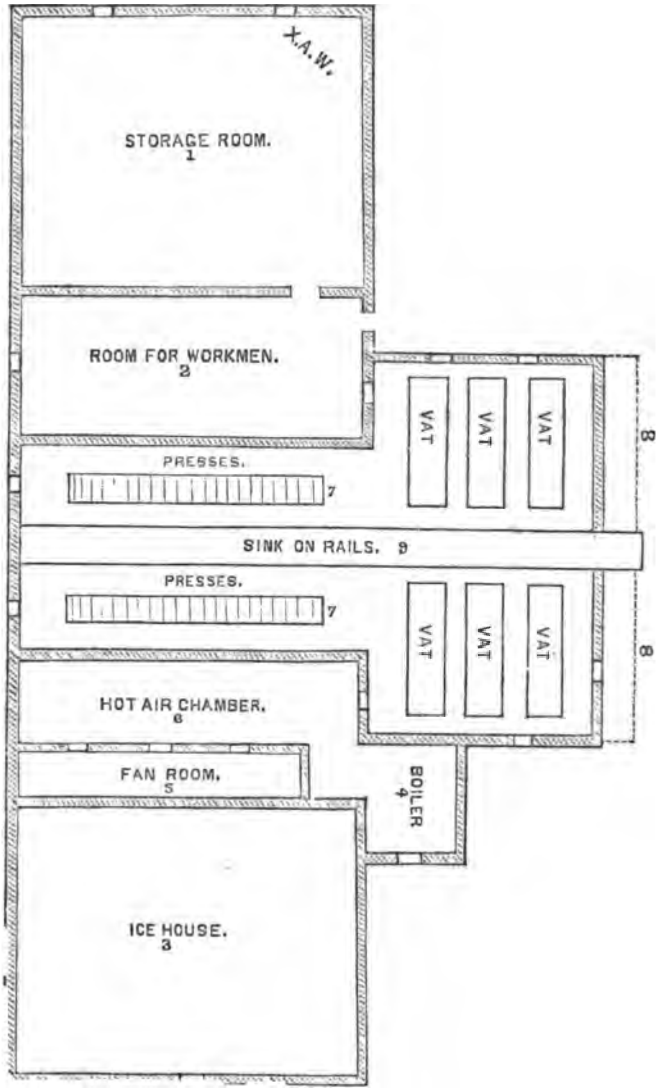


Fig. 3.

houghts which can be turned to good account.

The following is the description of the everal parts as given to us by Mr Maples :—

In this plan the building is 104 feet by 32 eet, wing 40 feet by 24 feet, with a boiler room 10 feet by 12 feet added. Build three storeys.

Ground Floor.—No. 1, storage room; N room for workmen; No. 3, ice-house; N room for boiler, or heating apparatus; N fan room; No. 6, hot air chamber; work-room for presses and vats; 8 8, a form at end of wing, over which th should be extended; 9 9, railway from form through the room; *b b*, presses; vats.

d Floor.—In the centre are two trap- up through which cheese may be l, by means of pulleys or otherwise. n side are shelves or racks, on which nay be placed for curing. The room ng be left open, or made into office,

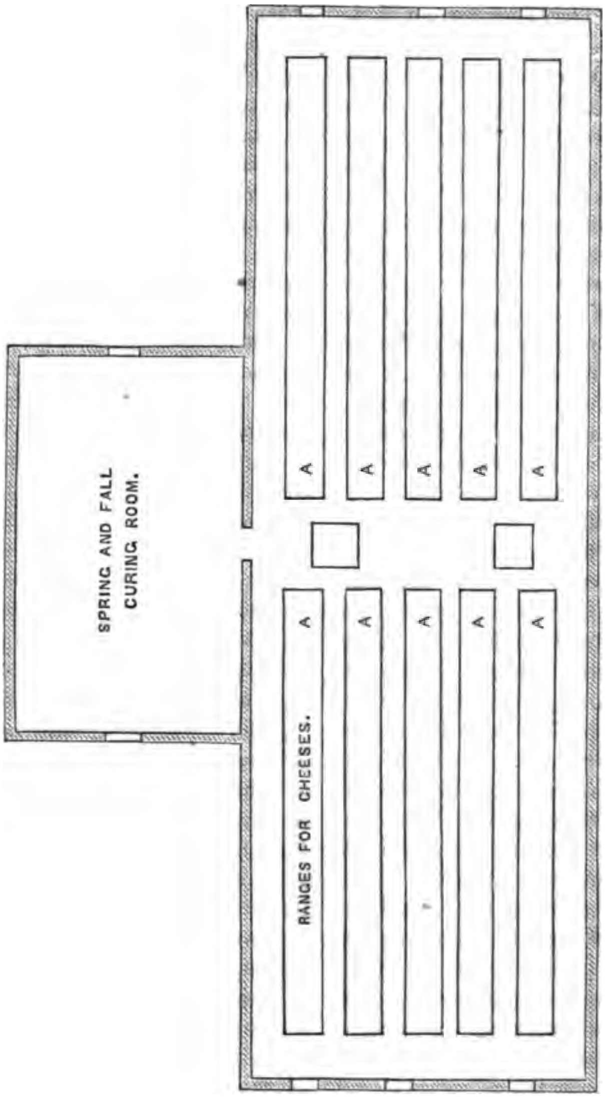


Fig. 4.

for curing or boxing cheese, as may ed, including stairway.

Floor.—Similar to second. As to e-room, rooms for hands, ice-house, can be changed to suit taste and nce. It is a matter of doubt whether ice should be kept in the building used for curing cheese, rather than in a separate house. It may cause too much dampness. There are two things especially arrived at in this plan; all others are only incidents. First, the convenience of the arrangement of the workroom. On the platform, at 8 8, may be placed platform scales for weighing milk in the cans. The scales are on rollers at the end of the railway; as the milk is weighed, it can be easily rolled to the vats, *a a a*, and drawn into them. The curd is to be heated by steam generated in the boiler-room. When the curd is sufficiently cooked, it may be taken from the vats to a salting-sink or rack, placed on trucks on the railway, and then easily removed to the presses and dipped from the sink into the hoops in the presses. On this same railway, the whey may be carried off if desired. The cheese, when made, is elevated from the immediate vicinity of the presses to the curing-room above. Everything is so arranged that the work is altogether; there is no heavy lifting in carrying milk, curd, cheese, or whey—an object greatly to be desired.

A second object is believed to be secured by this plan, and one which is more needed in the manufacture of cheese than any other thing—the control of the temperature of the curing rooms. In our changeable climate, sometimes these rooms are too warm, and at others too cold. To avoid these extremes, and control the temperature of the curing-rooms, this plan is suggested: in preparing the building, put in a flue between the joists over the lower storey around the main building; ceil the lower rooms over head. This flue may be made of brick, covered with sheet-iron, instead of the floor; at various points have dampers like registers in the sheet iron; pipes may be used instead of flues. In the fan-room, No. 5, a fan may be placed, on the principle of a fanning-mill fan, to be carried or turned by machinery, connected with the boiler or engine. Cold air can be admitted at the end of the room; openings are to be made in the lower part of the partition, between the fan-room and room No. 6. This room is to be tight, and connected with the flues above. When the curing-room is too [illegible] being put in motion, currents [illegible] forced into the room No. 6, [illegible] flues above, and, by means of [illegible] into the room at dif- [illegible] by having numerous openings or registers in the floor of the upper storey, these currents may be continued into the upper storey or upper curing-room. A change of air may thus be obtained in any weather, even when [illegible] motionless. It is admitted at many points ordinarily; currents of air are admitted at the door or window in such large draughts as to check or crack the cheese upon which the currents fall. By this process they are equalized and controlled.

In case the curing-room is too cold, the air may be heated in the fan-room by means of the boiler or engine, and by the action of the fan driven into the hot air chamber, and through the flues above, and distributed the same as the cool air; or a stove or furnace may be placed in the hot air chamber, and the air then heated, and by the aid of the fan driven through the flues, and by them and the dampers distributed in every part of the room, the registers in the ceiling over the second storey being sufficient to control and temper the air of the upper room.

Branch Factories.—Since the inauguration of cheese factories, great efforts have been made to improve the various parts of the system, so as better to adapt it to the wants of dairymen. The cheese-making factories of ten years ago seem exceedingly crude and cramped compared with those of the present day. The old tub, the wooden curd-cutter, and the swing beam press, are beginning to be regarded as curiosities of an old age, the rude implements of a primitive people, with which the present generation have had nothing to do.

Before the inauguration of factories, the progressive step of the dairy was slow, short and halting; but since their establishment, it has been rapid, long, and sure in its tread. How far we are to improve in the West in te years is, of course, a matter of speculation but if no progress is made it will not be fo the want of effort, or because new idea looking toward progress have not been trie

The latest suggestion, as an improvemen on the factory system, is that now (1865 being put to a practical test by L. N. Brow of the West Edmonston factory. At som central point an immense and commodio cheese-curing room is erected, capable holding the cheese from 1000 or more cow and radiating from this are branch factorie or simply cheap buildings, for receiving t milk and manufacturing the cheese. T cheese is properly marked, so as to be identified, and conveyed to the central dry house, where it is cured in the usual manner until marketed.

What is claimed in this plan is saving in the cost of building and fixtures, a better condition of the milk, and greater accommodation to dairymen in delivering milk. Thus a branch or manufacturing room is located among a few farmers living near each other, and one vat set up capable of holding the milk of 150 or 200 cows. One man only will be required to run the branch. There is but a small quantity of milk to be cooled in the evening, and as the distance need not be over ½ or ¾ of a mile for delivering milk, patrons are accommodated, and the milk is in better condition to be manipulated. On this plan, it is claimed a larger circle can be embraced, and the general manager has only to divide up his workmen instead of keeping them all together, as is now generally practised. The rennet will be made at one point, and will therefore be of uniform strength. The manager visits daily the several branches, and sees that all is properly conducted. When a few days' cheese have accumulated at each branch, a team is sent round, collects a load, and is hauled to the factory. Everything being arranged in the several buildings, looking to convenience on the proposed plan, the work will be executed to the best advantage. We have given the general outlines of the system; but whether it can be made to work on a large scale is a question to be determined by actual test. The hauling of milk for a considerable distance is n objectionable feature in factories. Where t is done by patrons, it seriously breaks in pon the work of the day. There are objecions to the branch system as proposed, one f which is sickness, accident, or necessary bsence on the part of manufacturers. Where ey are all together, the loss of one hand r a few days does not disarrange business s it would on the other plan.

The plan, however, suggests a feature that doubtless could often be put to use. When a neighbourhood of farmers are located a considerable distance from a factory, and some one of their number has suitable buildings for manufacturing, it might be well for the factory to hire the milk room or cheese house on the premises, set up a vat, and send out a man to manufacture. Or the neighbours could club together, and make all arrangements, only requiring of the factory a good cheese-maker. The short distance for delivering milk, and greater ease in getting back the whey—if this last be thought of value—would be inducements for such an arrangement on the part of the farmers. There are many entirely cut off, by reason of distance, from factories who would be glad to avail themselves of these advantages. To such this plan opens up a way for them to obtain all the benefits of the associated systems.

We suppose there are a good many neighbourhoods where there is a cluster of 150 to 200 cows thus located at too great a distance from a factory to make it convenient or economical for delivering milk. A cheap building, costing perhaps $100 or so, could be made to answer the purpose, and the hauling the cheese once a-week to the factory would be but a trifle compared to hauling milk twice a-day. Factories generally, we think, should include in their operations teams for the delivery of milk. Let a price be established for taking the milk at the stable to the factory, and manufacturing it into cheese then there is no time to be wasted by the farmer getting up the team and hauling milk twice a-day. Many complain that this business of dairymen individually delivering milk is onerous and confining; that it spoils the day for team and man, and that on this account some plan should be organized whereby the farmer may be relieved from this work. Whether the system proposed by Mr Brown is to become popular, and prove to be all that is claimed for it, must be determined by trial.

THE HENWIFE'S KALENDAR FOR APRIL.

BY the end of the 21st day, or the morning of the 2d, the chicks, if strong, will have left the shell; the weak ones may be a few hours longer. Sometimes it is necessary to chip one side of the egg a little, in order to assist the chick to leave its prison; Dorkings especially often require this, the shell usually being so thick; but, as a general rule, the less they are interfered with the better. The shells and addled eggs should be removed, the hen fed, and the chickens left undisturbed for twenty-four hours. At the end of that time they may be fed with oatmeal moistened with a little milk or water, not too wet, but of a friable consistency. Pure water must also be set before them: to prevent them from wetting their feathers, and to obviate any danger of drowning, which not unfrequently happens, the water may be put in a saucer half-filled with small stones. The scale on the extremity of their bill may be removed with the finger nail, to enable them to pick up their food without encumbrance: some green food should also be given. If convenient, the hen and chickens may be placed under a coop in a warm dry place, and food and water placed outside, but so that the hen may have access to them. The coop must be cleaned daily. The chickens must be fed very often, and at all times have both food and water within their reach. They are very fond of butter-milk, and it contributes very much to their growth, but it must be given in addition to water, and not instead of

Their last meal should be at nightfall. They will rush from under the wing at the approach of the henwife, though it should be ten at night, and pick up their crumbs as briskly as if it were ten in the morning. They are also very early astir; it is no unusual thing for them to be looking out for something at four in the morning. To meet this want, it will be found highly advantageous to lay down their provision at night; and should there be light in their cellar, as there ought always to be, they will be scraping and picking at peep of day. It is of great importance that the chicken-house should open to the east, that the chickens may have the benefit of the morning sun. But we are anticipating, and must return again to the first days of chickenhood. To the oatmeal, which was the first food, may be added, about the third day, an egg hard boiled, and minced down, mixed with bread crumbs. In a week tailings of wheat may be given, or even ordinary grain; the hen will break it for the chicks, and even feed them. It is essential that the same individual feed and attend to them: they will be frightened at the appearance of a stranger. The mother hen is constantly on the watch for the enemies of her family, and ready to do battle in their defence. For this reason the henwife requires to be on her guard, and to handle the chicks as little as possible; for the hen, in defending her progeny from fancied danger, is apt to inflict upon them real and even fatal injury.

The Naturalist.

COLLINGWOOD'S RAMBLES IN THE CHINA SEAS.[*]

COLLINGWOOD is what is popu- rly called "a sea-beast man." a botanist and a zoologist and l of a good knowledge of most of Natural History, his peculiar s Marine Zoology. In all the won- d *outré* creations, which render the so attractive, he is specially at It is not to be wondered at, therefore, hould have eagerly availed himself pportunity to visit the shores and f the China Seas, nor that in his of his voyage the denizens of the hould occupy a larger portion of its history than the inhabitants of their

an hardly imagine anything more to a student of Marine Zoology h an expedition. The China Sea less explored scientifically than most ts of the tropical seas, and there was the prospect of new discoveries but inty of an ample harvest of rare, , and little-known species. Dr Col- thus glowingly describes one out of his experiences of this kind :—

> e 1st of August we anchored at the edge of ve coral reef marked on the charts as Fiery- f, from the circumstance of the ship 'Fiery- ving been wrecked thereon. The surface was perfectly smooth and glass-like, so that th of 60 or 70 feet we could see the anchor bottom, among blocks of coral, as distinctly been but 6 feet from the surface. Never otten is my first ramble over this coral reef n afternoon. Taking a boat with a couple I left the ship and steered in search of the portions of the coral-strewn sea. A short ht us upon a two-fathom patch, over which I allowed the boat to drift slowly, and leaning over the side and looking down into the mirror-like sea I could admire at leisure the wonderful sight, undisturbed as it was by the slightest ripple. Glorious masses of living coral strewed the bottom; immense globular madrepores; vast overhanging mushroom-shaped expansions; complicated ramifications of interweaving branches, mingled with smaller and more delicate species; round finger-shaped horn-like and umbrella-form lay in wondrous confusion—and these painted with every shade of delicate and brilliant colouring—grass green, deep blue, bright yellow, pure white, rich buff, and more sober brown, altogether forming a kaleidoscopic effect of form and colour unequalled by anything I had ever beheld. Here and there was a large clam shell—chama—wedged in between masses of coral, the gaping zigzag mouth covered with the projecting mantle of the deepest Prussian blue; beds of dark purple long-spined Echini, and the thick black bodies of sea cucumbers—Holothareæ—varied the aspect of the sea bottom. In and out of these coral groves, like gorgeous birds in a forest of trees, swarmed the most beautifully coloured and grotesque fishes, some of them intense blue, others bright red, others yellow, black, salmon coloured, and every colour of the rainbow, curiously barred and banded and bearded, swarming everywhere in little shoals which usually included the same species, though every moment new species more striking than the last came into view. Some, like the little yellow Chætodons, roamed about singly; others in large shoals; some were of considerable size and seemed to suck in the little ones like motes in the water; and, in an interval a small shark about 10 feet long, swam leisurely along.

On this reef he made a curious observation, which seems to us to indicate that some sea-anemones have the power of paralyzing or fascinating fishes without actual contact. Dr Collingwood thinks otherwise, and that it is a case of parasitism, that the fish lives and takes refuge in the stomach of the sea-anemone; but his own account of the incident seems opposed to this. In any view the observation is curious :

"By far the most remarkable circumstance I met with on the Fiery Cross Reef was the discovery of

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les of a Naturalist on the Shores and Waters ina Sea. By Cuthbert Collingwood, M.A. 868.

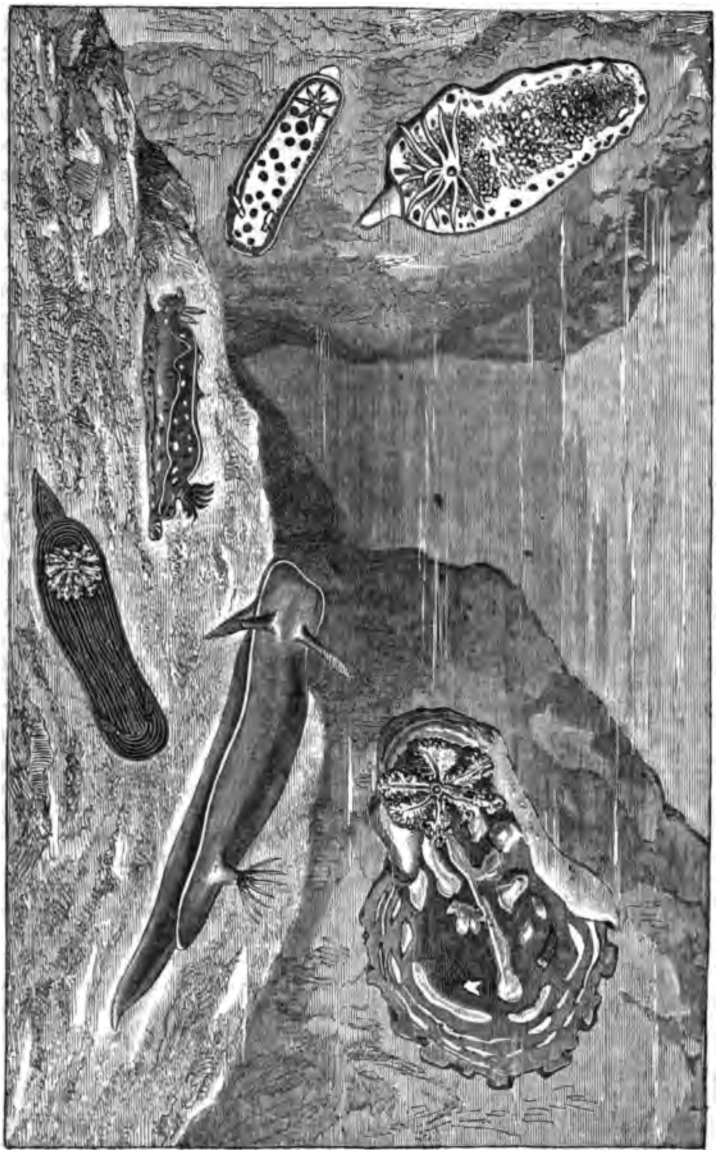
some actineæ of enormous size, and of habits no less novel than striking. I observed in a shallow spot a large and beautiful convoluted mass of a light blue colour, which, situated as it was in the midst of coloured corals, I at first supposed to be also a coral. Its singular appearance, however, induced me to feel it, when the peculiar tenaceous touch of a sea-anemone made me rapidly withdraw my hand, to which adhered some shreds of its blue tentacles. I then perceived that it was an immense actinea, which, when expanded, measured fully two feet in diameter. The tentacles were small, simple, very numerous, and of a deep blue colour; and the margin of the tentacular ridge was broad, and rounded, and folded in thick convolutions, which concealed the entrance to the digestive cavity.

"While standing in the water breast-high admiring the splendid zoophyte, I noticed a very pretty little fish which hovered in the water close by, and nearly over the anemone. This fish was six inches long, the head bright orange, and the body vertically banded with broad rings of opaque white and orange alternately, three bands of each. As the fish remained stationary and did not appear to be alarmed at my movements, I made several attempts to catch it, but it always eluded my efforts. Not darting away, however, as might be expected, but always returning presently to the same spot. Wandering about in search of shells and animals, I visited from time to time the place where the anemone was fixed, and each time, in spite of all my disturbance of it, I found the little fish there also. This singular persistence of the fish to the same spot and to the close vicinity of the great anemone, aroused in me strong suspicions of the existence of some connexion between them.

"These suspicions were subsequently verified; for on the reefs of Pulo Pappan, near the island of Labuan, in company with Mr Low, we met with more than one specimen of this gigantic sea anemone, and the fish, so unmistakeable in its appearance when once seen, again in its neighbourhood. Raking about with a stick in the body of the anemone no less than six fishes of the same species and of various sizes were by degrees dislodged from the cavity of the zoophyte, not swimming away and escaping immediately but easily secured on their exit by means of a small hand-net. Thus the connexion existing between this fish and the anemone was demonstrated, though what is the nature and object of that connexion yet remains to be proved.

There are at least two species of these anemone-exploiting fish, and a second species of the same genus differs from that just described in having black and cream coloured vertical bands instead of orange and white. Such a fish I have seen; evidently related to the first-mentioned, living in a tub which did duty as an aquarium, in the possession of Mr Low at Labuan, which had been obtained from what was probably a second species of fish-sheltering anemone. This fish was remarkably lively and amusing, and of a disposition I can only describe as knowing, and lived in good health in this tub for several months—a proof that the connexion between these animals, whatever its nature, is not absolutely essential for the fish at least"—(p. 152).

Greatly to its detriment we do not doubt—as surely as the residence of an oyster in the stomach of a gastronome would be to it. This is not a case of parasitism on the exterior of the body, nor of a parasite specially framed to spend its life in its interior, nor of an animal taking occasional refuge under the wing of another like the Pinnotheres pisum within the valves of the horse mussel. A Holothuria, from the same seas, of which a figure is given in the "Voyage of the Astrolabe" (Holothuria ananas), is said to shelter a fish in this manner, and we doubt not for a similar purpose. The notodelphs and other small crustaceans, which are said to take refuge in the sac of some Ascidians is another parallel case. Some years since we argued that these small animals were not guests taking refuge with a host, but victims to its appetite. We found in the sac of Ascidea virginea that although many of the notodelphs were swimming about quite lively, others were lying dead against its walls and others were half digested, and we accounted for the circumstance of any being alive by the large size of the sac and the small size of the notodelphs. It might be some time before they were seized or entangled in the ciliated meshes of its walls. We think the case of Dr Collingwood's sea-anemone and banded fish quite parallel to the ascidian and the notodelphs. The fish were being devoured by the anemone, and the proof of it is that those fishes which he routed ou from the interior of its gape were languid and easily caught. The process of digestion had begun upon them, but they had not ye been deprived of life. This is our explana tion of the circumstance; but there remain the curious fact of the fish hovering like a fascinated bird over the mouth of its devourer and returning to the spot again and again after being driven off by Dr Collingwood The distance at which Dr Collingwood describes the fish to have been from the tentacle of the anemone, independent of the fish mming away and returning, would seem iclusive against its having been touched by e acontia or cnidæ of the zoophyte, which ght otherwise have accounted for the stufaction of the fish. Mr Gosse, in one of s books, mentions an instance in which a tle fish swimming about in health and vigour ed in a few minutes in great agony through e momentary contact of its lip with one of e emitted acontia of Sagartia parasitica; and the effects of the acontiæ of different species may be different, and more especially may be more powerful in larger species from tropical seas.



Nudibranchs of the China Seas.

Dr M'Donnell at one time thought electricity might have something to do with producing the stinging effects of these acontia; he no doubt subsequently abandoned that hypothesis; but the probability of that agency being concerned in the matter should still be kept in view.

Apropos to animal electricity we observe that Dr Collingwood quotes an instance reported to him of the occurrence of electricity in a snake.

> "A circumstance was told me by the colonial chaplain, Rev. J. Moreton, which, although it may seem apocryphal, I am unwilling to pass over altogether in silence. He found on one occasion, outside the verandah, a snake about five feet long, of a reddish colour, but not mottled like a boa. It had had its head crushed, that being the usual way in which the natives destroy snakes, though it is not always immediately fatal to them, for they will crawl after such an injury. Mr Moreton told me that he took the snake in question by the tail by his thumb and finger, and instantly felt a strong electric shock, which ran up his arms to both his shoulders, so that he dropped the snake in alarm. Although much surprised at the circumstance, not being a naturalist, he neglected to take any means to preserve the reptile." (p. 173).

The nudibranchs of these seas, like the sea anemones, startle the beholder with their gorgeous and bizarre colouring. The woodcut on page 369, shews the form of some of the most striking of these; but it is unnecessary to say that their beauty is entirely lost for want of colour. The upper one on the left, marked as from Kelung, is cream-coloured, edged with orange, and marbled with vermilion markings. That below it, from Haitan Straits, has a chrome margin, and is spotted with deep crimson. The next to the right, from Makung Harbour, is deep blue, spotted with yellow, and with the tentacles and branchiæ of bright vermilion. The next from Labuan is striated with delicate alternate hues of brown and yellow. The long, smooth one from Labuan is reddish, passing into a brilliant amethystine head, and edged with opaque white, the tentacles and dorsal branchiæ orange. The last on the right, from Fiery Cross Reef, is described as reaching nearly eight inches in length of an olive-green colour, and covered [illegible]umy bosses and tubercules, which ren[illegible] a most unsightly object. Most, if [illegible] these, are undescribed.

It would require more space than we can give to follow Dr Collingwood through the numerous other marine animals touched on [illegible]him—crabs, molluscs, fishes, star-fishes, [illegible]ides, hydrozoa, forminifera, &c. The marine zoologist will find much to interest him. A valuable paper, which had been already published in one of our scientific periodicals, on the luminosity of the sea, is incorporated with the narrative. In it the various kinds of phosphorescence are defined and traced to their origin, the number of divisions being five, viz.:—1. Sparks or points of light; 2. a soft liquid, general and wide spread effulgence; 3. moon-shaped patches of steady light; 4. instantaneous recurrent flashes; 5. milky sea. All these are traced to animal life of some kind or other, and his explanation of the phenomena is as follows:—

> "Ever since, many years ago, I became acquainted with Mr Groves' 'Researches upon the Corelation of Physical Forces,' I have looked upon that ingenious theory as the rational explanation of animal luminosity. Light, heat, electricity, magnetism, motion, and chemical force, are all interchangeable, and each may manifest itself in the form of the other; but although these are called the *physical* forces, who can say that they are not *organic* forces also? One of them, which long since would have been regarded as eminently inorganic, is now fully recognised as an organic force produced by vital organs, and regulated by the will of the animal exhibiting it. I allude of course to electricity, an agent which is possessed by several fishes, and we know not by what other animals, a force which is produced directly through the agency of nervous power, for the regulation of which a special cerebral lobe is recognised. If this nerve force or vitality can display itself in the form of electricity, why should it not do so also in the form of light? In the more highly organised luminous animals, as in Lampyris (the glow-worm), in which nervous centres exist, there is a special organ for the development of light, doubtless regulated by some part of the nervous system. Kölliker, in his examination of the luminous property of that insect, came to the conclusion that there was neither combustion nor phosphorus in the case, but that it was the product of a nervous apparatus, and dependent upon the will of the animal. In others the contractility of muscular tissue or of sarcode substance, which contractility is itself a vital act, seems sufficient to produce the phenomena in question." pp. 407, 408.)

The nature of the phenomenon treated by Dr Collingwood is a very difficult one, and we should have liked to have had the views of such an intelligent naturalist a little more developed as to the modus operandi by which the luminous result is attained. No one will dispute the position he has entrenched himself in, that if all forces producing physical

are corelated and convertible it
to any of them. But what we
liked to know his opinion upon
them is in operation in any par-

They may all or any of them
p with it, but taking the pheno-
particular stage, what is its then
ien we see the ocean apparently
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iat they are the same. Our own
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iustion. Combustion, indeed, is
erstood to be only another word
ion. Hence, where there is no
ould follow that there can be no
and some examples of phosphor-
fluorescent light seem to exist
oustion where there can be no
The light in such instances may
be due to the presence of oxy-
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hing else takes the part and per-
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e to ascribe the phenomenon to
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uch recondite physiological ques-
turn to some of the other more
l material subjects noticed by Dr
l. The woodcut, page 372, is a
on which he gives of the curious
ced by the degradation of sand-
, on the south side of Kelung
Formosa. We should have been
refer the appearance to the action
ier, but Dr Collingwood ascribes
s action. He says:—

> of aqueous action upon the sandstone
> conspicuous in some parts of Kelung
> ir the cave before mentioned, and im-
> n the verge of high water, is a tall isolated sandstone rock, having precisely the appearance of an old ruined castle, and appropriately named Ruin Rock, which forms an excellent land-mark by which to anchor a ship. The harder layers of sandstone having defied the effects of weather, and the spray which is dashed up during the north-east monsoon, to which the harbour is exposed, the softer portions have at the same time been more or less excavated, leaving a mimic resemblance of the ruined chambers of a three-storied building. But the most curious and extensive effects of the direct action of the sea are to be found at the entrance of the harbour on either side. That on the north side is called Image Point on the chart, but the south side is even more remarkable, and no less deserves this name, while the effects are on a larger scale." (p. 89.)

To what formation these sandstone rocks belong Dr Collingwood could not determine, but they are part of a carboniferous series, which he thinks is probably of recent origin. Over them lies a bed of coal, which is worked for economic purposes, and which would be of immense value were it all equal to our British coal. But although tolerably good for domestic purposes, it does not answer for steam vessels. In fact, it would appear that it is almost as cheap to take out coal from England as to buy this coal on the spot, the quantity required to produce the same heat being so much greater of this Formosan coal.

Dr Collingwood visited another bed of coal in Borneo, which cropped out from beneath a thick layer of vegetable mould. He speaks of it as indifferent looking, and it would rather appear that although plenty of coal is to be found in that region, it is probably all tertiary, and although useful for domestic purposes not likely to be of much value to our shipping.

While in Borneo he passed some time at Sarawak. The accompanying cut (page 372) shews the picturesque character of the Malay houses there. He also took a trip up one of the rivers among the Dyaks, and visited one of the stalactitic caverns which are known to exist there. It is known that some of these caves are ossiferous, and probably in no part of the world is there a more interesting field for palæontological discovery than in them. It might help to clear up the curious problem, why such an extensive country as Borneo should be almost entirely destitute of larger mammals. Dr Collingwood puts it thus :—

> "It has been remarked that large quadrupeds bear no proportion to the luxuriance of vegetation of the tropics, and the greatest herbivorous animals abound most where the soil and climatal conditions do not encourage the greatest development of vegetation. Thus it is in Borneo, where, although the country is a vast forest under an equatorial sun, large animals are rarely met with."—(p. 216.)

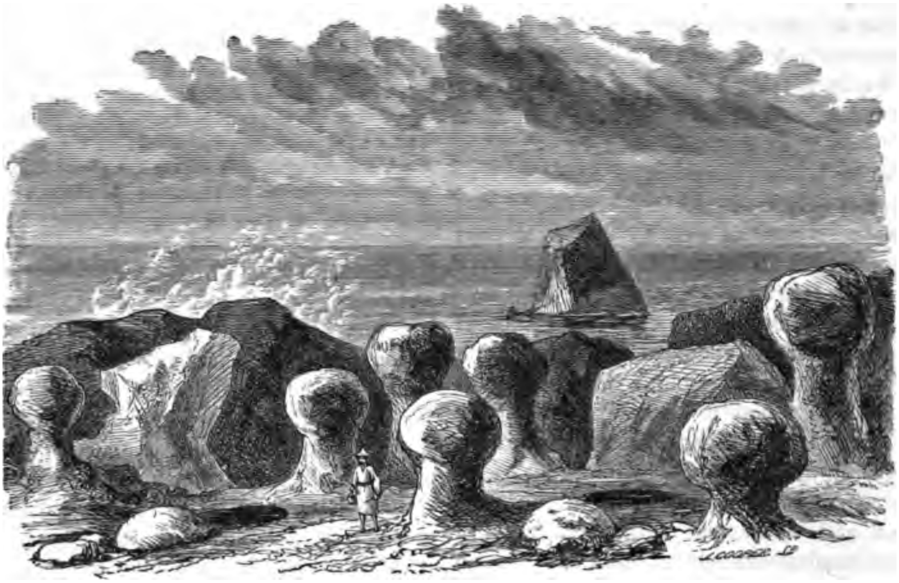


Fig. 2.—Rocks in Kelung Harbour, Formosa.

Malay Houses - Saravak.

The fact, as regards Borneo, certainly is as here stated; but we cannot agree with the generalization as to some connexion or re-ation existing or being to be expected between the amount of vegetation and the presence or absence of larger mammals in any land. The two things have nothing whatever to do with each other, and the presence or absence of every kind of animal solely depends upon whether the land in question at its appearance above the sea was in connexion with or near to some other land where such animals existed, so as to allow of its being peopled by emigration or dispersal from it. The special puzzle with regard to Borneo is, that while it is abundantly peopled with arboreal and aquatic mammals such as bats, monkeys, squirrels, otters, and tapirs, there is an almost entire absence of animals which require solid ground for the sole of their foot to rest on. A semi-arboreal tree cat or leopard, and a small light-footed deer is the nearest approach to a truly terrestrial animal. With these exceptions, and even these, perhaps, can scarcely be truly called exceptions, there is nothing mammalian on Borneo which could not live on a half-drowned land. If we suppose Borneo formerly entirely flat, as the greater part of it still is, and united to Java, and then sunk until it became level with the sea, like some parts of New Guinea at this moment, where here are groves of mangroves growing on the flat muddy beaches, extending backwards for several miles into the interior, before the solid land is reached, we should have a land covered with timber, in which all the arboreal and semi-aquatic species might live for long ages, but in which the larger animals of Java, such as the elephant and rhinoceros, could not possibly survive. The elephant no doubt now occurs in Borneo, but, as is rightly said by Dr Collingwood, it is not aboriginal but introduced. The date and history of the introduction is perfectly well. known. It was by the Sultan of Sooloo, who received some elephants as a present from our own East India Company, and finding them troublesome and expensive to keep, turned them loose in Borneo, where they have bred and multiplied. From time to time it has been said that the rhinoceros also occurs in Borneo, but no well authenticated instance of it has ever been recorded, and the belief among naturalists is almost unanimous that it does not exist in Borneo. Dr John Edward Gray indeed has, during the last season, given Borneo as the habitat of a new species of rhinoceros, which he has described in a paper read to the Zoological Society. But neither the species nor the locality will stand much scrutiny. It would appear that Dr Gray has lately had occasion to examine in detail some of the skulls of larger mammals which are stored in the British Museum, and on comparing the series, he has found some which do not quite correspond with the rest, and instead of considering these, as has hitherto been the custom, as abnormal specimens or variations from the type, he has arrived at the conclusion that they are distinct species. Thus in comparing the skulls of the tapirs, he found one marked "Tapirus Americanus, from South America," in which he thinks the "position of the internal nostril on the palate," is so different from that of the common South American tapirs, as at once to separate it from them, and he has consequently described it as a new species "not yet observed in the living state," and given it the name of Tapirus Laurillardei.

Next, dealing with the rhinoceroses in the same way, and increase of appetite apparently growing by what it feeds on, he has doubled the dose this time. He gives us two new species of rhinoceros also "not yet observed in the living state," which he has described under the names of Rhinoceros Floweri and Rhinoceros nasalis from skulls in the British Museum—the former from Sumatra and the other from Borneo. As to the value of these new species this is not the place to give an opinion. When we mention that Professor Owen considers Dr Gray's characters as merely individual variations, we imagine that few of our readers will require one; but as to the locality of Borneo it is of importance to the present question, and, being a matter of fact and not of opinion, there can be little difficulty in settling it. The locality is given by Dr Gray broadly and distinctly in his diagnosis simply as "Borneo" without query or qualification; but on looking to the particulars of where it came from and how it came (which it is but justice to Dr Gray to say he always gives with scrupulous fidelity so far as they appear to him to be relevant), we find to our surprise that he has no warrant at all for saying that the species is from Borneo. No one has told him that the skull belonged to a Bornean animal. It turns out to be a mere inference on his part: "The skull was purchased of a dealer, who said that he received it direct from Borneo." Even the dealer does not say it is a Bornean specimen. We all know how a collector gathers from all quarters as he moves along, and when his store is large enough, ships them home from the last port he comes to. Are all that have been so accumulated to be held as having been natives of the port of shipment? Because this skull was shipped from Borneo does it follow that it was killed in Borneo? In these seas the communication is so frequent and easy between the different islands, that special caution in ascribing a locality is necessary; and as if to warn Dr Gray from the blunder he was falling into, he found another skull in the British Museum collection, marked from Java, possessing exactly the same abnormalities as he gives as the characters of his supposed Bornean species.

Dr Gray gets over this difficulty by the conjecture that the locality Java may possibly be a mistake for Borneo: "It was purchased of a dealer, and has been marked R. Sondaicus, Cuvier, Java, by some previous possessor. The habitat may depend on the person having decided it to be R. Sondaicus."

Had the facts been reversed, and the skull been labelled "Borneo," we might have accepted the conjecture that Java was meant, seeing that that would only be reconciling the facts to all that we previously knew on the subject. But Dr Gray's proposition asks us to run counter to all our previous knowledge, merely for the sake of supporting his new quasi Bornean species—one of whose chief titles to confidence depends on its being a native of the new locality. We have no desire to prejudge the question. The rhinoceros *may* be a native of Borneo—the skull said to have been received direct from Borneo *may* have been so received, and the animal that bore it *may* have been killed in Borneo, and it *may* have been by omission that it was not stated to have been killed there—the skull labelled Java *may* have been so labelled by mistake and *may* have come from Borneo [illegible] Rhinoceros nasalis, [illegible] species "not yet observed in the living state"—and variations in the nasal bones *may* furnish sufficient characters by which to discriminate species; but we think until some or all of these possibilities shall have been proved to be facts, it would be rash to conclude that the rhinoceros is a native of Borneo.

Leaving the larger species out of view, Borneo possesses many remarkable mammals. One of the most interesting of these is the Galeopithecus Philippensis, which although not confined to Borneo is abundant there. It is particularly interesting, from the mixed affinities which seem to be combined in it. It may be described as a mixture of the monkey and the squirrel, and its habits bear out the suspicion of the affinities which its form suggests. Although placed by systematists next to or among the quadrumana, it has in many of what may be called its minor characters, strong sciurine elements. We shall contrast its mode of flying from tree to tree, as narrated by Dr Collingwood, with a short account of a similar propensity of the flying squirrel in North America given by Sir Charles Lyell in his tour through America; and we think the reader will feel disposed after reading them to allow a greater share of the squirrel element to be present in the Galeopithecus than he had perhaps previously been disposed to admit.

First hear Dr Collingwood:—

"Sitting in the verandah of Mr Martin's house about sunset, I had an opportunity of observing the habits of the flying squirrel (Galeopithecus) the Kerbong of the Malays. The animal came streaming through the air from a distant clump of trees, its flank membranes extended, and its long tail stretched out behind, and with a graceful sailing motion at length arrived at a tall tree trunk which had been left in the midst of the cleared jungle, on the lower part of which it alighted. The animal then began to ascend the trunk in a spiral direction, running a little way at time and then stopping. Having reached the branches it selected one, along which it crept until it had reached the extremity, when it suddenly launched itself into the air, and glided away on outstretched wings in the direction of another tall tree, about 150 yards distant, gradually descending as it proceeded, and finally alighting upon the lower third of the trunk. Again it crept up the branches, and again it cast itself off, making this time for a more distant tree, when it was lost to view in the jungle. At the same moment another Galeopithecus arrived at the first-mentioned tree, which standing alone, offered a good mark and a convenient resting place for these singular animals. The one repeated the same process, only going in the opposite direction. Every evening at the same hour these animals, probably the same individuals, mig

> ıaking use of the same trees in their flight, so
> ıs easy to say when they had alighted any-
> hat would be their next flight. Having
> the highest part of the tree, they sailed
> .way to the next, with grace and swiftness,
> lually falling line, with no apparent move-
> :heir flank membranes, but with the evident
> ' accurately guiding their flight to the next
> heir progress, which may thus be described
> cal zigzag." (p. 211.)

notice of the habits of the North Ame-
[uirrel, by Sir Charles Lyell, to which
:, is as follows :—

> r travelling so much in the woods, I had
> t sight of more than three or four species,
> am informed, to their nocturnal habits. I
> that I had not yet seen the flying squirrel in
> and was surprised to hear that Dr Buchanan
> :rved about a hundred of them every evening
> al weeks, near Philadelphia, on two tall oaks,
> tumn when acorns and chestnuts were abun-
> l when they had spare time to play. They
> using themselves by passing from one tree
> :r, throwing themselves off from the top of
> e oaks and descending at a considerable angle
> he base of the other; then inclining the head
> just before reaching the ground, so as to turn
> ıt on the trunk, which they immediately climb
> peat the same manœuvre. In this way there
> lmost continuous flight of them crossing each
> the air between the two trees."—(*A Second*
> *'he United States*, by Sir Charles Lyell, p.

:e leaving the zoology of Dr Colling-
book, we shall just quote one sugges-
the obtaining of small birds :—

> Klings" (a race from the Coromandel Coast
> of whom considerable numbers are settled
> ngapore) "here have a mode of obtaining
> ds which might prove useful to the practical
> gist. I have more than once seen one of them
> ı Banyah, armed with a straight tube or sum-
> out six feet long, and a piece of soft clay,
> ch having broken off a morsel, he rolled it
> tle ball between his hands, then placing it in
> and taking aim at a small bird singing in the
> above, he noiselessly blew the pellet, and
> . the bird to the ground, stunned, or it might
> l. A little practice, one would imagine,
> ıable a performer to play upon this instru-
> t wantonly, we would hope, but for the pur-
> procuring small birds when they are required
> rvation without injuring the plumage." (p.

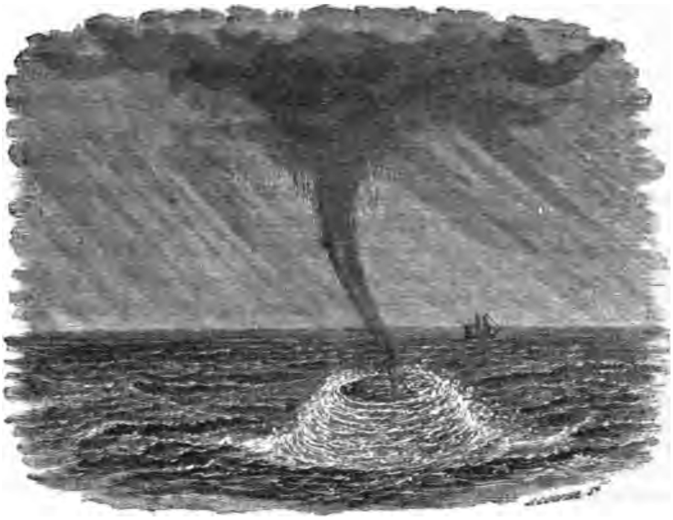
an endorse Dr Collingwood's sugges-
d say, from personal trial of the South American blow-pipe, that a moderate degree of skill is not difficult to attain.

Dr Collingwood saw the diamond mines, or rather diamond washings, in Borneo. For the most part diamonds are of small size, but of a brilliant water, although large ones have been occasionally met with. The largest Bornean diamond belongs to the Sultan of Matan, and is valued at £269,738, weighing as uncut 367 carats. In the sand and gravel of the river bed, at depths averaging from 6 to 18 feet below the surface, and in strata sometimes several feet thick, the diamonds are sought for with varying success by a large number of Malays, who sink shafts at a distance of 20 feet apart in the shallow parts of the river. They construct huge pyramidal frames of large and strong bamboos, about three yards square at the base, and by means of heavy stones they sink them upon their claims, so that they may not be carried away by the stream, and at the same time shall point out clearly the working place of each party. Their next important stock in trade consists of a number of large shallow round wooden bowls. Filling a bowl with gravel from the river bed, they (standing in the water) hold the bowl, just skimming the surface, and give the contents a rotatory motion, cautiously and skilfully allowing the muddy and lighter sandy particles to flow over with the water, until nothing is left at the bottom of the dish but the larger and heavier sandy and gravelly substances, which are then carefully examined for the diamonds.

We have left ourselves scarcely any space to speak of Dr Collingwood's observations on the vegetable products of the countries he visited. The most important part of these is perhaps his notices of what is doing commercially in the cultivation of the different useful plants, such as coffee, cotton, coconut, sago palm, pepper, sugar, nutmeg, gamboge, gambir, &c. He has noted the advance making in the cultivation of these with an observant eye—and those interested in them will find some useful incidental information. Of purely botanical information there is not a great deal. The following observation on the behaviour of the sensitive plant, altho not new any way, may interest the general reader:—

"One of the commonest roadside plants of Singapore is the sensitive plant (Mimosa sensitiva), which grows in profusion in waste places, and on banks by the wayside.

It is an exceedingly low spreading plant, of suffruticose habit, seldom rising much higher than the grass among which it grows, or more than six inches from the ground, but covering large spots, which are distinguished from the rough herbage by its neat regular foliage. It seems to be almost constantly in flower, for in October, November, and May, I noticed numbers of the little round tufts characteristic of this acacia (mimosa), and of a pale flesh colour. The manner in which the aspect of such a little bush is altered by a touch is very remarkable. Brush your foot over the luxuriant little plant as you pass by, and the whole bush seems to disappear, and you look back for it almost in vain; the leaves have all closed up, and the stems become depressed, and nothing is left but a few withered sticks on the grass. Try to pluck a sprig and it fades between your fingers; so that it is very difficult to gather and examine it in an expanded condition. But if you will carefully take between the finger and thumb the pulvinus or swelled base of the leaf stalk where the little thorns are situated, without touching any other part, and pinch it hard before attempting to break off the sprig, the pinnae will remain expanded; relax your hold, however, and they will immediately begin to close up."—(P. 257.)



A Waterspout in the Chinese Seas.

The natural physical phenomena of the world were not overlooked by Dr Collingwood, and we cannot better indicate his attention to them than by closing our views with an engraving of a waterspout copied from a sketch carefully taken by himself, and which tells its own tale better than any words could do.

Hunting, Fishing, and Shooting.

EXCURSIONS IN THE SOUTH OF CHINA.

BY LIEUT. OLIVER, ROYAL ARTILLERY.

A VISIT TO SHAO-K'ING-FU AND THE MARBLE ROCKS.

[Concluded from page 281.]

VILLAGES are frequent on both banks, and thickly populated, nearly all hav- ig good schools attached to them, and every ild above tender years was able to read, and ost to write. Ni-Tawng and Poo-e-Shui were e next villages of importance; the latter emarkable for its large modern college, ounded in the first year of the reign of the te Emperor Hien-Fung. On the north bank nd opposite are large examination halls, mar- ed by a forest of mandarin poles; also, a rge depot for salt. In the back-ground ere the Nam-wan-Shan, or "hills of the outhern bay," averaging some fifteen hundred eet elevation. On the shores here were oble specimens of the shady banyan tree Ficus Indicus) and in the sun on the banks ere numerous lizards, among them the achydromus sexlineatus and others. We xamined some large fish-tanks at Sha-Wan, which were preserved the Li-in,* a fish r superior to our carp, and growing over n pounds weight.

In the middle of the river here is the large t island of Kwang-li, forming a triangle, with s two sides to the north. The channel on e south side is the shallowest, but gave 3½ thoms. The mountains now frowned close ove us, and in vain the eye sought for a gap rough which the broad volume of the Si- iang could pass. However, the river narrowed rapidly as we ascended it, and when we had left the white fort sixteen miles behind us, we could perceive a magnificent but narrow gorge gradually opening to our admiring gaze. The river here, narrowed suddenly from 1000 to 200 or 300 yards, winds swiftly through a vast rent in the mountain chain, whose dark precipices rise perpendicularly on either side several hundred feet above us. The wooded summits culminate on the south side in a peak 2800 feet elevation, and on the north in one of 1800 feet. We entered this pass at 1.45 P.M., barely able to stem the current, whilst above us hovered some large kites (Milvus melanotis) that frequent this locality. The mountain pass is called the Antelope Pass or Hibiscus Gap, sometimes the Shiu-Hing-Hup. At its eastern entrance is the village and custom-house of How-li. In the pass itself, we sounded, and repeatedly found no bottom at 12½ fathoms, even close to the edge of the beetling rocks. The naked sides of the cliffs were caverned and hollowed by the waters many feet above us, testifying to the effects of the furious summer freshets, known and dreaded even at Canton under the name of the "Western floods."

There are narrow paths cut along ledges on the face of the cliffs to enable the crews to tow their vessels against the strong eddies and currents in the pass. Along them are here and there little shrines placed to record the loss by wreck or flood of some hapless mariner. The place is romantic in the extreme, and naturally the imaginative Chinese people it with fabulous monsters as well as with piratical bandits, who are, perhaps, not so fabulous. It took us two hours to pass through this rocky chasm, four miles in length. The western extremity is here marked by a small pagoda, on a conical peak 300 feet above the sea.

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* The Li-in = The Gouramier (Osphronemus olfax).

The sun seemed to shine brighter when we had left this dismal pass of Shiu-Hing-Hup, and at our exit was disclosed a cheerful view of the extensive valley of Shao-K'ing, bounded by a fine amphitheatre of mountains, with no less than seven pagodas of various sizes in sight at once.

What the origin or meaning of these many-storeyed monuments may be no one seems to know. They are sometimes accounted for by the Chinese as symbolical of the all-pervading Fung-Shuei, a superstitious genius which animates the cardinal points, hills, water, and weather, including the general prosperity of the neighbourhood.

A lofty pagoda on a high hill is supposed to bring good luck and advancement to all who dwell within its sight and influence. Although Shao-K'ing boasts of so many of them, I am afraid their influence has greatly diminished. When a merchant has completed a great speculation with success, or when his argosies have returned laden with wealth, he sometimes erects one of these follies to commemorate the event.

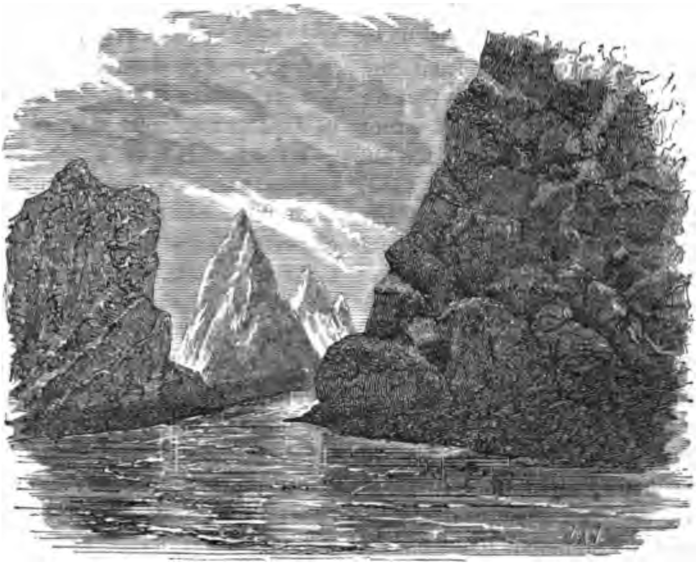
Below the suburbs of Shao-K'ing extensive fisheries were passed, with large dip nets, bag and stake nets. These nets are in the river close [illegible]. Beyond these, about six miles [illegible] Antelope Pass, begin the [illegible] reached at [illegible] ...urbs are buil[illegible] [illegible] ar[illegible] [illegible] and [illegible] ...fruits and trees [illegible] of them [illegible] are generally [illegible] grass-grown. The town itself lies at a [illegible] distance back, and protected by a high solid embankment [illegible] all fear of inundation. Irrigation is provided for by means of well-constructed culverts and sluices. Like all district towns, Shao-K'ing is tolerably defended by stout brick walls and bastioned gates, now in a slightly ruinous condition. It was six o'clock or more before we made fast to the shore, but the sun had set and the town gates were closed, so that entrance to the town was denied. However, we were permitted to send in our cards and letters of introduction to the Mandarin.

The extremity of our journey by water was now attained, and we had travelled 75 geographical miles in all from Canton. Of course, we could have come up much quicker, but we preferred seeing the country by daylight, and walking along the shore for observation and sporting, to travelling by night. The regular passage boats take only from thirty to forty hours to do this distance in, according as the wind and tide are favourable or not.

Thursday the 14th March, whilst dressing for a state visit to the chief magistrate of Shao-K'ing, we sent to hire some palanquins and bearers, who arrived when we were at breakfast; their price having been suddenly raised, we learnt on inquiry that some officials had been extorting "squeeze money" from them. We had pre-arranged the hour for our reception, and started at half-past nine in eight palanquins, along the bund, and through the suburbs, entering the city walls by the south gate. The city seemed in a ruinous condition, but there were remains of antient grandeur in the moss-covered ruins of many antique yamuns, temples, and ancestral halls, the finest being those on the site of the Viceroy's Palace in olden days, all well shaded by long-lived banyans. The principal streets alone seemed to be thickly populated, and in them crowds of curious citizens assembled to see us pass by, being kept back from pressing on us by an escort of Mongol braves, sent to meet us for that purpose. Besides numerous silk shops, chow-chow houses, and opium divans, were armourers and bowmakers. The yamun which we entered was similar to most of the third-rate yamuns of Canton. Various retainers ushered us

etached open halls, where official
s transacted, into a more comfort-
shed apartment, where we were
teously received by the venerable
, who, after the endless chin-chin
indispensable preliminary, begged
seated, and regaled us with tea,
ed by melon pips, whilst a tray,
: a large Pope Joan board, was
he various partitions being filled
tmeats and preserves. He had
peace had been proclaimed, but
been published publicly yet to the
le. On hearing that some of his
es had been squeezing our bearers,
us that they should be bastina-
split bamboos. He begged us to
y impertinent conduct from the
wnspeople, and warned us that we
elted or maltreated unless he sent
of soldiers to guard us. He in-
kindly on our accepting the guard,
l also act as guides to us about
, and we found them very useful
our sketch-books, shot belts, &c.
ing the yamun we made our exit
ity by the north gate, and cross-
bridge over the moat found the
th leading into the country, bor-
ome smaller suburban villas and
ith well cared for gardens around
clusters of lychees, plantains,
arica papaya), plum and guavas
nense), water-melons (Cucumis ci-
. Beyond, in the open country,
of cotton, the ground-nut (Arachis
rom which they express a valuable
ligo, Cassia, castor-oil, and various
hol, (Cajanus florus) gram (Cicer
yams, and sweet potatoes, cocos,
portion preparing for rice plant-
ole of this extensive plain around
being as highly cultivated as a
rden. The villagers were em-
arrowing, the harrows being drawn
uitous buffalo, and mostly tended
The plain is bounded by a high
ountains, mostly wooded, and any
ating eminences are covered with
horse-shoe or omega-shaped graves, the cemeteries of departed generations. In the midst of this alluvial deposit, at about three miles from Shao-K'ing, rise seven abrupt and detached rocks of red-veined marble, with remarkable peaked summits, averaging about 200 feet above the level of the plain, their distant outline reminding one irresistibly of the Needle Rocks intensely exaggerated. They present features of more than ordinary interest, not only to the geologist, but also to the antiquarian, and are famous throughout the two Kwangs, for their wonderful caverns, whilst the monastic retreats, perched in seemingly inaccessible hollows and ledges on their precipitous sides, are objects of pilgrimage and veneration for many miles away; and various superstitious legends are related in connexion with the far-famed Marble Rocks of the seven stars (Sam-Seen-Koon).

We ascended by a laborious climb up narrow paths to the summit of the easternmost rock, which is the highest and largest of them all, and obtained an extensive view for our trouble, the fantastic peaks of the neighbouring rocks forming a picturesque foreground. There are two Budhist chapels on this rock, besides some residences for the monks. In the lowest chapel was an elaborate image of Budha, representing that deity with forty-eight arms. The faces of the rocks are overgrown with bushes and small trees, with creepers and ferns growing in the crevices. Every here and there are seats and benches, with colossal inscriptions cut in the solid stone, dating from the dynasties of Yong-Ching, Kang-Kee, and Keen-lung. The trees and rocks were full of the feathered tribes, such as titmice (Parus minor), plenty of the Chinese starlings (Acridotheres siamensis), chattering with great noise, rollers (Eurystomus orientalis), and others. We now descended, and walked along the foot of the rocks, where are some large ponds in which the art of pisciculture is carried on by the Budhist monks with great economy and success. They buy the fish spawn in jars at the market, and hatch the ova in the shallow paddy fields, which are arranged in terraces connecting one with another, so that the young fry can be shifted as may seem necessary. They fatten up their fish in stews, producing magnificent specimens of carp. Throughout the whole of China fish is remarkably cheap. We now examined the great cave and temple of Kon-Yum-Ngam. This cave has evidently been formed by the action of a subterranean river, which has thoroughly undermined the whole rock. There are two entrances, one through a low fissure on the south side, and the principal one on the north side, leading through an upper grotto, in which the stalactites have been tastefully left to form a natural canopy, whilst the stalagmites have been carved into quaint figures of warriors, altars, figures of Budha, immense candelabra, and vases, forming a crystal joss-house, ornamented with the customary banners, votive tablets, burning joss sticks and other accessories.



Marble Mountains.

[illegible] grotto, at the entrance, a descent [illegible] steps brought us into the great cavern [illegible] was but dimly illumined by our torches [illegible] twisted bamboo, and the [illegible] remained in mysterious darkness until we fired some Chinese rockets up vertically, which lighted up the lofty roofs and crystallized stalactites 120 feet above our heads. In every direction were bra caverns, one of which we explored, bu stopped soon by deep pools in the be former torrent. Most of the others wer full of water. By lighting bonfires of grass behind some of the screens of tr rent rock, where pillars of stalagmit stalactite were joined in one, marve charming effects were produced.

The whole rock seemed hollow: wh discharged our guns with some blank nition the reports reverberated like th the echoes dying away in hoarse murn the distant bowels of the mountain. grand certainly, and heightened by crystals from above becoming detac the vibration, and tumbling about o scattering, as they struck any rocky tions, with a myriad of scintillations attention was now drawn to a hollo forming a natural stone drum. In s was something like a mushroom. O struck smartly, it vibrated with a sound — a very Chinese Memnon, which superstition has attached man natural abilities. We put a large b Chinese crackers underneath it, whic ignited, gave us a startling volley of

gs, which severely tested the vibra-
vers of the marble drum. The
as indeed deafening, frightening
s bats from their hidden retreats.
res of the monks in their long robes,
naked coolies, and the braves in their
ue attire, lighted up by the glare of
light, with the savage depths of the
a background, formed a subject for
of a Rembrandt.

cool of the evening we retraced our
Shao-K'ing, and by sunset left the
lace of Shao-K'ing on our homeward
reaching the Pass of Shin-Hing-Hup
The entrance to the gorge looked
nal and uninviting, so that our boat-
anxious to anchor outside the nar-
ge until daylight, but we insisted on
eeding, in spite of their hideous tales
Lus and other horrors. So we
through the dreary pass, all being
quiet as the grave, only disturbed by
ional flight of the night-herons (Nyc-
riseus) and the distant cry of the
ed owls (Otus brachyotus), which
these rocks. We were soon fast
nd were about half-way through the
hen we were suddenly awakened by
n with another boat, and the cry of
s from our boatmen, who came
below in extreme terror. We
p on deck, and soon saw that the
he other boat, against which we had
was as frightened of us as our men
hem, and had also rushed below, and
y getting out their long pikes, so we
to shove the boats apart, and retire
umbers, after a hearty laugh at our
ce. By midnight we had arrived at
m-house of How-li, and made fast to
junks lying close to the shore there.
15th of March, on arising in the
we found ourselves the objects of
to all the crews of the various craft
the custom-house (established for
he war tax). The vessels bound up
formed a convoy loaded with salt
se from the upper waters, bound
ds with indigo, oil, paddy, firewood,
tea. There is only a small village at How-li, where necessaries can be procured for victualling the passage boats, and we here hired a guide to take a few of our party up to the wooded mountains of Ting-Hu-Shan to visit the famous monastery which reposes under its shadows. The remainder of our party crossed over to To-Ki to shoot snipe, which abound in that locality. Our guide, by name Teen-Tuk, with two boys, Ayow and Asam, led us inland to the north-west, about five miles across flat open fields, in which the skylarks (Alauda cœlivox) were carolling under the sunshine. The country is diversified by small hamlets, ponds, and marshes, full of waterfowl, gallinules, &c. We followed the course of a shallow stream tumbling over its rocky bed, tracing it up a long valley, on each side of which arose lofty hills, here and there scarped perpendicularly with huge boulders and moraines, lying scattered on the slopes at their base. Above were dense woods rising high among the mists that hung about the summits. The atmosphere turned chilly, and we soon lost sight of the sun, the Scotch mist turning into rain as we ascended, and we entered a ravine in which a well-repaired paved pathway of rather steep gradient led through "the groves of the pleasant mists" on "the mountain of the golden lake," the said lake being a mysteriously deep tarn among those hills. The blending of the sub-tropical vegetation with the foliage of trees, due to increased elevation, presented us with varied yet exquisite forest scenery. Among the trees flitted the Ying-Ko or ring parroquets (Palæornis Rosa), the sole Chinese representative of this tribe, whilst little striped squirrels (Sciurus tristriatus) leapt nimbly from bough to bough, whilst the call of the pheasant and the tapping of the woodpecker (Picus chloris) would frequently be heard mingled with the song of the Hwa-mei (Leucodioptron sinense), which the Chinamen are so fond of domesticating for fighting purposes as well as song. The timber trees were loaded and entangled with numerous vines, bauhinias and other lianas, whilst various orchids, ferns, lycopodiums and pendent lichens ornamented the stems of fallen timber.

Through occasional breaks in the dense foliage of the trees we could see hanging woods and rocks towering far above us, with here and there a summer-house or shrine, to which neat zig-zag paths led in various directions. After reaching a level of about 1200 feet above the river, we found the monastery of Tek-Chime, with its fine new temple and hospitable brotherhood. The Superior of the establishment received us with flowery Chinese compliments and played the part of host most graciously. It appears that the old temple had been burnt down by the rebels in 1859, so that they had been obliged to build a new one, the Hing-Wun-Tz, and now they heard that the rebels were again approaching. They shewed us an immense bell, just new from the foundry, of some 2000 catties weight; they must have had great trouble to convey it up these heights. The monks here are not allowed to eat flesh, but are restricted to fish and vegetable food; they gave us some capital rice and mushrooms, the latter being novelties to us; they had many handsome and rare plants, cultivated with great care, roses and chrysanthemums, of which the owners were very proud, besides dwarfed trees, fantastically trained shrubs, with odd sports and grafts, which Chinese amateurs take such pleasure in.

We returned to our boat in the afternoon, and later in the evening pulled across the river to examine the mines on the southern side of the Shin-Hing-Hup. These mines or quarries consist of pits eight hundred feet deep, from which a valuable black stone (cannel coal?) is produced. It is a black stone almost like jet, takes a considerable polish and is used for inkstands and palettes; the surrounding rock appeared to be coarse grit rock and beds of solid dark slate. The echoes here were very amusing, high notes being repeated distinctly several times in succession. The quarries were not being worked, as the mandarins had demanded an excessive royalty on the produce. Late in the evening we dropped down stream with the tide to Lo-un-Chun, a village opposite to Kwangli island, and nearer to the Teng-fu mountain than How-li.

On Saturday, 16th March, we started at 7 A.M., and took the same route to the Tek-Chime monastery, reaching it in two hours and a half. Here we provided ourselves with some stout poles to climb the upper heights, and procured a guide. After three hours' hard climbing, during which the woods became gradually thinner and, finally, disappeared, we halted at a spot, beyond which our guide declared that he had never been. However, we pushed on until we reached the summit, but the thick clouds breaking for a few minutes disclosed a much higher peak than that on which we were at (4000 feet), and separated from us by a vast chasm, at the bottom of which lay far below us the Enchanted Golden Lake. We were much disappointed at not having reached the highest summit, but there was nothing for it but to descend *via* the charming deep tarn, the spare waters of which were carried off by a series of cascades and waterfalls, by following which we arrived in due time at the foot of the mountain under torrents of rain, and were heartily glad to regain the shelter of our boat.

The next day (Sunday) we passed Sy-nam and reached Fat-shan, where we spent all Monday morning returning to the monotonous duty at Canton the same evening.

The Country Gentlewoman.

BREAD-MAKING.

UGH excellent bread is to be n most parts of the country from t, as many persons have a decided r that which is made at home, nefit we give a few directions for We commence with a few recipes east.

TO MAKE YEAST.

iantity of water desired, add suffi- o make it very strong, and let it two or three hours. Then boil utes, strain out the hops, put the in the kettle, let it boil moderately, ur until a stiff batter is formed. ughly scalded, put it in a jar to hile a little warm, add yeast to When well fermented, add to 2 he yeast a half teacup of salt. cool place. A tablespoon twice e sponge for a half-dozen loaves of st made in this way will not sour.

ounce of hops in a gallon of it is reduced to half a gallon, it off through a hair sieve, and ing hot on half a quartern of flour, l all the time; mix in two table f moist sugar; when luke-warm, int of old yeast to quicken, keep- arm place while making. If no at hand, half a pint of old ale will uicken, or an ounce of German en made, reserve half a pint by d keep it in a cool place for your g.

ollowing recipe, which introduces an excellent leaven for making ead, a patent was obtained by the Ir Richard Tillyer Blunt), which red. The following is copied from specification in the Patent Office, 'To make a yeast-gallon of this composition, such yeast-gallon containing 8 beer quarts, boil, in common water, 8 lb. of potatoes, as for eating; bruise them perfectly smooth, and mix with them, while warm, 2 oz. of fine honey, and 1 beer-quart of common yeast. For making bread, mix 3 beer-pints of the above composition with a bushel of flour, using warm water in making the bread; the water to be warmer in winter than in summer, and the composition to be used in a few hours after it is made; and so soon as the sponge, or the mixture of the composition with the flour, begins to fall, the first time, the bread should be made and put into the oven."

The following are good substitutes for brewer's yeast: (1) Boil 1 oz. of hops in 4 quarts of water, until the hops fall to the bottom of the pan; strain it, and when milk-warm, add 6 ounces of flour and 5 of sugar; set the mixture by the fire, stirring it frequently; in forty-eight hours add 4 lb. of potatoes, boiled and bruised fine; next day bottle the yeast—it will keep a month. One fourth of yeast and three of warm water, is the proportion for baking. (2) Boil 1 lb. of good flour, a quarter of a lb. of brown sugar, and a little salt, in 2 gallons of water for an hour; when milk-warm, bottle and cork it close, and it will be fit for use in twenty-four hours. 1 lb. of this yeast will make 18 lb. of bread.

To remove the bitterness from yeast produced from highly hopped beer, put a glowing (red hot) lump of charcoal, about the size of a large hen's egg, in say a pint of bitter yeast, and after giving the yeast a good stir, strain it through a fine horse-hair sieve, when it will become perfectly palatable.

HOME-MADE UNFERMENTED BREAD.

To make white bread.—Take of flour 3 lb. avoirdupois; bi-carbonate of soda in powder, 9 drachms, apothecaries weight; hydro-chloric (muriatic) acid, 11¼ fluid drachms; water, about 25 fluid ounces.

To make brown bread.—Take of wheat meal 3 lb. avoirdupois; bi-carbonate of soda, 10 drachms; hydro-chloric acid 12½ drachms; water, about 28 fluid ounces, or 1½ mutchkins and 1 gill. First, mix the soda and the meal or flour as thoroughly as possible. This is best done by shaking the soda from a small sieve over the meal or flour with one hand, while they are stirred together with the other, and then passing the mixture once or twice through the sieve. Next pour the acid into the water, and diffuse it perfectly, by stirring them well with a rod of glass or wood. Then mix intimately the meal or flour, and the water so prepared as speedily as possible, using a wooden spoon or spatula for the purpose. The dough thus formed will make two loaves somewhat larger than half-quarterns. They should be put into a quick oven without loss of time. This is most conveniently done in tins, or in iron or earthern pots or pans. The earthen deserve the preference, as they yield a better bread than either the tin or iron. Common flower-pots suit particularly well. Iron does better than tin. But the loaves may be made into a batch, and baked in the same way as fermented bread; and if a thin flat tile be placed between each loaf, the tendency to cohere, which, however, is not greater in this than in other doughs, will be obviated, and the bread will be, in all respects, equal, or rather superior, to that baked even in earthen pans. The dough may also be formed and baked like cottage loaves. The oven should be made hotter than for fermented [illegible] a portable one. [illegible] there is no other, and a common [illegible] answer the purpose. About an [illegible] half will be required for the baking. [illegible] he proportions of [illegible] make common [illegible] This [illegible] as soon [illegible] heat is applied, [illegible] carbonic acid, being set free in [illegible] expands the dough, or raises [illegible] as to form bread. If either the [illegible] the acid be in excess, the bread [illegible] taste of the one or the other, accordingly; but it will not be on that account unwholesome. The salt so formed will be sufficient to flavour the bread for the most palates; but if more be desired, the soda and acid may be somewhat increased, or a small portion of common salt may be superadded, by dissolving it in the water before that is mixed with the acid. Much handling and hot water are hurtful, by causing the union to take place before the proper time. For this reason the water should be as cold as possible, and more or less of it must be used, as experience will readily direct, to suit the varying quality of the flour, which necessarily differs with seasons, soils, and other circumstances. The dough should not be made stiff. The thinner it is, so that it can be handled conveniently, the lighter will be the bread. When too much water has been used the bread will be unpleasantly moist. Milk may be used, on particular occasions, either wholly, or, in fact, instead of water. The soda should be diffused equally through the flour. If it should be deficient in any part, the dough will not rise there; and if in another it be too much, or in a little lump, in that place the bread will shew a yellow spot. Such marks are disagreeable to the eye, but not otherwise injurious. The largest quantity of flour that can be mixed with care at one time, by a beginner, is 12 lb.; but three times that amount will not be too much for an experienced workwoman.

The whole process of preparation for the oven need not exceed a quarter of an hour, and any person capable of ordinary attention may conduct it, for on a small scale it is as simple and easy as the making of a common pudding, except, perhaps, that accuracy in quantities is more important. The writer of this article has seldom known a cook fail, even on her first trial, when properly instructed. The only apparatus required, in addition to the usual kitchen furniture, is a graduated glass measure, to measure the acid, a small set of apothecaries weights to weigh the soda, a small sieve and a wooden spatula. As just observed, accuracy in measuring and weighing is essential, but this requires no qualification beyond the most common attention.

THE

OUNTRY GENTLEMAN'S MAGAZINE

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THE SUTHERLAND DUCHESS IN HER WINTER ROBES.

BY JOHN KENNETH WILSON.

IT has been snowing heavily, if one may judge from the quantity on the window panes. Most strangers and tourists have long since eft Sutherlandshire for warmer winter quarers, but residence still compels my nose to ront the amount of northern blast, which the keyhole permits to penetrate the apartment. All the rest of my body is under blankets, nd would remain there long enough were it ot for that horrid knock at the bedroom oor, and the sleep-dispelling Gaelic of the ervant-maid,—"*Tha e leth uair an deigh cuig, gus tha'n gille seilg air tighinn, lér cead.*" It is half-past five, and the gamekeeper is ome." So, as it is of no use to cause the rl to return, which she would otherwise evitably do, with a voice waxing louder and uder every alternate five minutes, until it mounted to such a shriek that it would force e, as it does on some mornings when I have e misfortune to elicit it, to thank providence at I am still a bachelor,—I must get up and ress, for we are going out to get a roe-buck, nd to have a peep at the country,—the true utherland Duchess in her winter-robes.

A few minutes suffice for dressing and reakfast, and now for Ronald Ross, the amekeeper, whom a friend has kindly sent o assist me. He is in the kitchen, honest man, and so are my boots, I may therefore e excused for breaking rather suddenly in on him. "Aha, fairly caught, Ronald !" This exclamation is caused by hearing a subdued amount of scuffling and giggling going on behind the door, but on my entrance the girl is baking as fast as she can, and Ronald wiping the guns, only I observe ten finger-marks of flour on his fustian shooting-coat, and her chin suspiciously red from contact with his beard. "Good morning, Ronald." "Good morning, sir. Down charge dog, you brute, oh fie," &c.

It is useless to ask Ronald if he thinks it will be good weather, as no mortal can foretell here what it is going to be until in the thick of it. Wrapping our plaids tightly first round our own throats, and then round the nipple-throats of our guns, we start off; but, as usual, I have to wait a few minutes for my companion, who has left something or other in the kitchen, which he calls a shot-bag, but which I shrewdly suspect is something the maid can give him.

We have a good walk before us across the heather hills which bound the shores of Loch Shin. The snow has ceased, but all the country is covered, and there will be fine roe-tracks in the birch woods by the loch side. A *balachan*, or overgrown boy, joins us on the road, to act as beater. It is of no use taking a dozen beaters for roe where the woods are thin; one boy and a good retriever are worth a score of roaring gillies.

A smart walk brings us to the so-called "Barony" of Gruids,—a patch of small turf hovels, or *boans*. One of these boans, now a broken down outhouse, scarce fit for the reception of cattle, attracts attention by its comparative size, as it looms, "like a huge black snail," through the grey of the morning. "A Cromarty man once lived in that house, sir, and a queer body he was, always breaking stones, and pouchin' them into his plaid-corners. Some said he was a builder, and some a mason, and others did not know what to make of him; but I always found him a chatty kind o' body, speaking about stones and ice, and what he called boulders, and *murrains*, and tho' I knew that beasts took the murrain, I never knew they got it from stones."

"Stop, stop, Ronald, I once knew the man you speak of, and must have a look at these broken rafters, for they once sheltered the great geologist Hugh Miller, for he it was who lived here: the water-worn stones of his plaid-neuk gave origin to his writings on Highland glaciers, and your 'murrain' was the ice-morraines of the glacial epoch. A murrain seize upon you for speaking so irreverently of one whose memory should be dear to every Highlander!"

"Deed, sir, tho' I'm not understanding all your words, I mind there was something grand about the eyes of the bodach, and I thought then that he was no ordinary man."

Alas! where formerly was heard "the voice of prayer and praise,"* the only sound which now reaches our ears is caused by the light whish of a solitary grey crow—a bird which [illegible]s out of Ronald's range, before the disturbed crystal snow-dust from off the bare roof has reached the ground.

Leaving this dismantled ruin, we soon arrive at the loch side. Loch Shin, notwithstanding the vast body of water which it contains, is [illegible]nly not one of the finer Highland lochs, and cannot bear comparison in scenery with the English lakes, although, during certain seasons, it has peculiar beauties of its own. At present, during winter, its water dark and black, in vivid contrast to rounding snow, while from its surface shrill shriek rings through the frosty cry of the Great Northern Diver (C glacialis), perhaps uttered formerly same bird in lone arctic regions ove clad grave of a Franklin. Strings fowl rise far out of shot, disturbe crackling noise of the ice-encrusted s neath our feet.

"Lend me the glass, Ronald. thought so! those grey specks on the wild geese; but we have no ch stalking them, and cannot obtain the method the former St. Kildians usec

"And how did they get them, sir

"Why, I can only relate the moc scribed by a clergyman who visited S The islanders watch with great care at which the birds are most likely t night, which is generally that sid island on which the play of fish i which the geese are at work during and when they are fairly alighted, th repair to the place with ropes of thirt in length, to let one of their party c rocks to try his fortune among the throng. The fowler thus let down more men, who hold the rope lest l fall into the sea, slides over the fa cliffs with a white towel about his br he has a full view of the sentinel b gently moves along the ground on l and feet, creeping silently to the s the sentinel is perched on guard. cries *bir*, *bir*, the sign of an alarm, l back; but if it cries *grog*, *grog*, th fidence, he advances without fear alarm, because the goose takes hir of the straggling geese coming into and suffers him to advance. Th then very gently tickles one of its l he lifts and places on the palm of l he then as gently tickles the other, like manner is lifted and placed on He then artfully and insensibly n sentinel near the first sleeping goc

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[*] See "My Schools and Schoolmasters," by the late Hugh Miller.

[*] Rev. Mr Buchanan.

ıes with his fingers, on which it awakes,
ıding the sentinel standing above, it
ately falls a-fighting him for his sup-
insolence. This alarms the whole
ınd instead of flying off, they all begin
through the whole company ; while, in
antime, the common enemy, unsus-
begins in good earnest to twist their
till the whole are left dead."

a mi creidsim an ni a thà am ministeir
agràdh. I believe what the good
r says, but we could na get near Loch
ese, I'm thinking, tho' we were to cry
or *grog, grog,* until we were hoarse.
ıly way to get near them is to make
ome to yourself, by lying, in a spring
g, on the broad of one's back in a dry
their line o' flight, and sending some
ody to warm himself by running them
le ye're catching a death o' cold lying
g the scudding clouds, and then to
ıem as they come over ye're head. I
st a pair of good trews by trying that

air of trousers? how so, Ronald?"

: just them all, sir. But I chanced to
ı in a ditch that was'na dry, and it
zing hard at the time, and when I
heard a great rent, and on looking
und the best part o' my trews left
n the ditch. And it was'na that easy
ɔ get over the brig, through the village
, for fear of the lasses laughing at me;
st rolled my handkerchief round me
—*mar dhuine air a chasthach*—like a
ı past the houses. *Na scanna mhna-*
e old women who could na see right,
that I had on the kilt; and the young
ıat some of the southern gentlemen
n shooting at me there for diversion,
: I was hurrying home to get the shot
out! But there are some roe tracks
snow leading to that clump of birch
s. Now, balachan, wait here with the
we can take up our places in yon open,
him slip, and give a bit whistle as ye
rough the wood to drive them towards

ıg taken up our stations at some
stance from each other in the supposed "runs," a few minutes' waiting, and the sharp yelp of the retriever on their track brings several does and two fine roebucks at a galloping shot; while the almost simultaneous discharge of our guns bring the latter down in reeling struggles. Ronald had his *sgian-dubh* in the throat of one, and the retriever is choking at the throat of the other in a snow wreath. It is not pleasant to see the large lustrous eyes of a roe in death agonies, and even Ross, an old hand at this sort of work, shuts his eyes while his dirk is doing its business, muttering something to himself which sounds very appropriate, but whether a grace or a prayer, I never can make out. The great sight, however, is the balachan, his clothes torn by the passage through the bushes, his hair streaming in the wind, his face lighted up with anxious excitement, and his whole appearance as if ready to emulate the retriever by sharing its labour. We should excuse him, however, for the blood of his forefathers, who hunted on the "mountains of roe," is stirred within him, as he screamingly informs us, in expressive Gaelic, that "a high-headed buck, rushing forward like a dart, with its sharp-pointed nostrils panting for the wind, white-tailed, slender-limbed, along the bare mountain declivities, from the fear of being fired at, will not descend the hill."

Roedeer are easily brought within shot by adopting the quiet method thus described. If much noise or shouting, on the contrary, is made on their track, they leave the runs, break out into open ground. and are lost for the day. The shooter should adopt an easy motionless posture, a thin bush being quite sufficient to conceal him, as they look mostly behind when pursued, and do not observe objects easily in their immediate front. Should he have to change position in order to intercept them, let him do so while they are running, for when they stand still for a moment, it is generally to reconnoitre the path before them.

"Now run, balachan, and tell Rory the shepherd to bring a cart and pony for the dead roes. Tho' I'm thinking he'll not have finished his *braxy*-breakfast yet."

"Come, come, Ronald! No insinuations against the shepherds. You do not mean that they are constantly eating sheep that have died of inflammation?"

"I'm not meaning that their braxy never runs done, sir; but it's common among them at New Year times, at christ'nings, and burials, and when they've freens wi' them."

"And do the sheep really die from disease?"

"Na, na, there's little else than fat the matter wi' the beasts."

"But shepherds do not like gamekeepers, since the latter have forced them to put away their guns, so false reports may be apt to arise between these parties?"

"Well, I never speak ill o' decent folk, but some years past, I heard shooting on the moor, and went to see if any Assynt lads were troubling the grouse. But deil a bodach could I find, so I stepped up to Rory's to ask if he knew about it, for his house was on a hill that looked over the ground. I asked if he had heard the shots. 'Yes,' says he, 'but I thought they were from your gun.' Well, I staid all night to find out if any one would be there in the morning. I had scarcely sat down, before his wife told me that they had a child to be christ'ned next day, and that the minister and some freens would be up. Then Rory says to the wife, 'I've some ewes to look at before dark, but I'll no be long away, and ye can make the keeper a dish o' tea to keep him from wearying.' 'Na, na,' says I, for I thought he was going to give the shooters caution of the guest he had got, 'if ye've ewes to look, I'll go with you. I'm a tolerable judge o' mutton.' He did na look pleased, and muttered something about 'the house being the best beild in a cold night,' but I stuck to him 'till we came to a lot of prime sheep. 'Now, keeper,' says he, 'there's one of these ewes has the braxy, can ye see it?' 'It's yon fat one," says I, pointing to one that was panting wi' the running she had got from the collies. Deed, ye know a braxy sheep when ye see one,' says he; 'poor beast, she canna keep up wi' the others. Here, Shindy, seize her," quoth he to one o' his dogs, 'for I see now she canna run at all.' And neither could she, for what wi' the running, and fat on her back, and the collie hanging on to her hind leg, she was na as free as she might have been had she had her own way, and that very night he put her out of the reach of all disease; and, my certy, the minister and freens got prime braxy next day. 'Now, Rory,' says I, when I bade him good bye, 'I don't think you have been looking at the shooters so as to know them again, but if ever I hear any more firing on the moor, your master will hear o' that braxy on the deafest side of his head,' and I've never heard another shot since."

A curious case of shepherd conversion into gamekeeper, Ronald! But, as there is a cobble near, let us row across the loch to the corner of the road at the mouth of the river Tyrie, where I have arranged that a dog-cart shall meet us to drive to the nearest point from whence we can ascend Ben Clibric.

"That's very like a mad venture in this weather, sir."

"True, but the firmness of the snow will assist us over the bogs, we can get a drop at the Crask Inn to help us up, and as some one says:—

'Ta Heelan hills are high, high, high,
  An' ta Heelan miles are long,
But then, my freen, remember you,
  Ta Heelan whisky's strong, strong, strong,
  Ta Heelan whisky's strong!'

"Ferry goot observation, sir."

A quick row across the loch, and drive of some miles along the road, brings us to the Crask Inn. Landlords cannot equally complain of the rents of the wayside inns of the country, some of these houses being let at the moderate rate of a few pounds per annum, but any one inclined to speculate, or give a higher rent for them, may have a proximate idea of the commercial value of winter visitor from the landlord's own lips:—"*An rob-moran do luchd siubhail an rathad agaibh cheann ghoirid!*" "Well, Crasky, have mon travellens been your way of late?"

"Ach, wow! na, sir, none but a bagma that asked the road to Aultnaharra, and drunk drover that stopped for a dram!"

After a good rest and hearty luncheon, th down by a girl whose blue eyes, to elic simile, are "like the far-off hills e sun goes down," we drive a short ıer, and having alighted, commence ıt of Ben Clibric.*

ountain rises before us in vast undu- nd our feet crunch at one time over p hillocks of frozen snow, at another bogs containing the drainage from s hills, rendered passable only by the of their snowy covering. We tramp past noisy burns frothing over dark or tinkling musically among brittle . After passing several straths, gorge ed paths succeed, while above glitter- les of rock stretch up to the cold blue heaven. A few ptarmigan and snow- Plectrophanes nivalis), fly from before r astonishment at the unwonted in- winter visitors, and we can spy small ving spots among the more distant hich our glasses make out to be red y cropping the scant winter herbage ir feet have scraped bare, or starting t runs, as if frightened by the gro- adows thrown by the great grey rocks white snow.

imbing of a Highland mountain in a very toilsome business, but much gerous than many might, *a priori*, If the weather be favourably clear and the snow sufficiently hard to bear there is only the danger of slipping or er sundry precipices to be avoided, n easily be prevented if the climber roper previous knowledge of the e is traversing. It is far otherwise, if the weather be changeable, or the . A sudden mist may envelope every- ound in a funereal pall, which may y and helplessly surround him; the osened masses of snow from the rocks ay overwhelm him in an avalanche, which extrication might be impos- single false step in treacherous snow may cause other necessary but involuntary progress, perhaps terminating in a hurtle over some gigantic precipice, and a repetition of the Matterhorn accident in miniature may ensue. No one, therefore, should attempt to ascend without previous acquaintance with the locality, or the presence of a suitable guide, and tolerable meteorological assurance of a continuation of fine weather.

After some very arduous exertion we reach the top, which is called *Meall' a' neuion,* that is, the summit of the Bird.

What a world of snow lies at our feet! Had Dr Johnson been alive he would have called this "a most dolorous country," and designated Ben Clibric, from its immense bulk, "a considerable protuberance." The height of the mountain is 3165 feet, and the prospect from it most extensive.

Northward—yon distant shore is formed by the shattered walls of rock, which the stern Orkneys throw around, to stem the rushing tides which sweep their base. At this distance the soft white line at the feet of the high cliffs seems peacefully at rest; but were we standing on the summit of those peaks, the roar of surf would be in our ears, and that soft white line would throw the stormy waves of the broad Atlantic in our faces. Yonder, the tortured sea boils and dashes around the white light-house of Cape Wrath, fortunately, however, carrying along with its current the warm influence of the Gulf stream, that goes so far to temper and modify the climate of the country.

Westward—from the Atlantic to the German Ocean, appears that long regular succession of strata so ably described by Sir R. Murchison,* the Silurian system rising from low primary hills into noble mountains, with range upon range of snow peaks, the old red sandstone, where it occurs, drawing peculiar attention to itself by its elongated rectilinear ridges. The following table† gives the altitude of the highest mountains in Sutherland; but others, greater in number, of most singu-

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rthography of this name is variable, some in Clibrigh, others Ben Cleibrick, Klibreck, Klibrick, &c., but Ben Clibric answers pronunciation as well as any of these.

* Leeds Meeting of the British Association.

† Statistical Account of Sutherland.

lar and varied outline, and approximating many of those of the table in height, are scattered profusely over the country.

	Feet in height.		Feet in height.
Ben More	3431	Ben Uarie	1923
Ben Clibrec	3164	Ben Vealich	1838
Ben Hope	3061	Ben Horn	1712
Fionaven	3015	Ben Smorale	1667
Ben Hee	2858	Ben Lundie	1467
Ben Spionnue	2566	Ben Hutic	1345
Ben Armin	2306	Ben Bhraggie	1282
Ben Griam-more	1935		

Of these, the view of Ben Hope from the west is perhaps the finest of its kind in the kingdom, as it rises in abrupt and towering magnificence within a few feet from the level of the sea.

Eastward—lie the long, low, level flats of Caithness, a country which some one has compared to a "mesmerised arm," stretching from the bold abrupt undulations of Sutherland; south-eastward, portions of the peculiar formation of the oolitic series of strata can be seen, as it spreads from the Ord Hill of Caithness to the village of Golspie; and the geologist can revert, in imagination, to its wonderful age of reptiles; rejoice with the late Hugh Miller over the vertebral joints of an Icthyosaurus found at Helmsdale; or revel with a Murchison over the tooth of a Saurian.

Southwards—the hills of Rosshire loom in the distance, with Ben Wyvis towering above its fellows.

The grand element of the scenery is the oppressive and awe-inspiring solitude which surrounds it.

> "Abrupt and sheer the mountains shrink
> At once upon the level brink,
> And just a trace of silver sand
> [illegible] where the water meets the [illegible]

A[illegible] fair seasons the landscape is [illegible] by [illegible] flowers and insects, and the [illegible] the murmur [illegible] gently fal[illegible]...

> [illegible] sleep
> [illegible] sound but [illegible] ear to sleep
> Your horse's hoof-tread sounds too [illegible]
> So stilly is the solitude.

Now, however, the hum of insects and the [illegible]al of flowers are absent, a broad wintry [illegible] all and [illegible] white panoply of snow clothes the Sutherland Duchess in robes of dazzling purity, stainless, and paintless, except where the sun strikes and glances from some glittering silicious peak, burnishing its points, and casting sombre shades over the hollows; or again where the snow has fallen off some crested crag, over precipices where the giddy eye looks down with dread, revealing brown naked pinnacles and rough piled masses of rock, defiants of age and mockers of storm.

As for vegetation, there is almost none visible at present, a vast expanse of snow-covered heathy and treeless waste occupies the bulk of the country. Here and there a few birch-boughs can be seen, mixed with scrubby frosted bushes, gleaming with white heavy-laden branches, along the nearer loch-shores. Were the snow absent, however, and the foliage present, we would see fine clumps of natural birch and alder, affording retreat to solitude-loving roe and a great variety of other game.

Lochs! lochs! lochs! Tarns and blue lochans, hundreds of them, all more or less stocked with salmon or trout, and whose waters cover more than 24,000 acres of the county, glisten in abundance in every direction; some ice-frozen, others with sun-burnished ripples on their surface. At this distance they appear like jewels set in frame-work of frosted silver. To enumerat their names would be an impossible feat the oldest resident in the county; and eve trigonometrical maps gave only a very impe fect idea of their extent. Each has speci beauties of its own, but Loch Hope, Lo Brora, and Loch Assynt, are the three mo beautiful types of the whole.

One thing alone moves in the landscape—the streams—in spite of the hard struggles of cold winds to freeze, or the attempts [illegible] to stifle them. Many fine cascad and waterfalls occur in their beds; but it when spring tears up the winding sheet [illegible]now and mist from the mountains that th rush onwards to the sea with a force a impetuosity truly worthy of their origin, a uniting, form such magnificent rivers as Oykel, Caslie, Shin, Brora, Naver, and Laxfo o meet the influx of the rivers, in a ve trial of strength between salt sh water energies, the Atlantic, a, and German Ocean all throw *oes*, as they are termed, inwards, to land, thus constituting an immense sea-coast intersected by numerous bays, with co-mingled fresh and r lakes, visited during winter and ng by rare arctic birds and strange nimal life. But the sea has another sides the rivers to contend against lous rocks, such as those at Cape e Far-out-Head, and Whiten Head, from 200 to 700 feet of perpendicu- —restrain its inland progress, while ts rugged shores and caves result contention.

npossible for any language to do o the combined scenery of the d coast; but should any tourist wish of it for himself, let him go and och Eribol, where he may behold mountain, tremendous rock, sea, flowing water, in a ratio calculated h him, even although he may have, present writer, visited both Arctic, nd Tropical scenery.

islands dot the distant horizon; of little importance when considered lly, but when regarded in the ag- he returns of the Registrar-General mation to the effect that there are ds around Scotland, taking, as the of an island that it shall be of suf- ent to afford pasture to a sheep, and 994 persons reside on the 186 of ch are inhabited.

e ranges over numerous surrounding which, in summer, vie with each beauty, variety of scenery, and f pasture; and all capable of afford- r and sustenance to a large popula- the distant bark of the collie reminds sheep and not men roam through d a few sheep collected within ppear as the local representatives of summer flocks which are absent nter, feeding on Ross-shire turnips or southern diet. The mansions of sheep farmers, seen at long distances apart, "a sort of milestone peculiar to Sutherland," alone indicate, in many districts, the presence of man. According to the returns of the Registrar-General, there are in all Scotland about 100 persons (99.7) to a square mile. The county of Edinburgh has 746 persons to a square mile, the county of Sutherland only 13. Of course great allowance must be made for the mountainous and in-arable character of much of the land in the latter; still, after every allowance is made on this account, there can be no doubt that the county might be made to bear a much larger population, with advantage both to residents and proprietors.

The great want of Sutherland is a proper middle class, intermediate between the small crofters, on the one hand, and the large farmers on the other; and this desideratum can only be supplied by a just equipoise of population. If a system of mixed farms were introduced, and the farms let to those who have shewn industry and perseverance in the management of their crofts; and, above all, were the leases extended to such a period of time as would give proper inducement to the tenants to lay out their energies on it, a proper middle class would soon be created. When speaking to the tenants I have often had it remarked, that the fact of their crofts being let from year to year, was one reason why they did not expend more labour on them, for, say they, "why should we work for the next person, or *sassenach*, who may get our croft?" By the creation of a middle class, the social chaos produced by the removal of the tenantry would be best replenished. Sutherland would get new living robes, and then let those in power see that they keep them aright, and not throw them aside into Canadian, American, or Australian wardrobes.

But as Ronald's nose seems blue, and the icicles hang like stalactites from his beard, now for a race to the bottom with the cloud shadows, as they flit fantastically over the snow surface. After a race, rendered highly exciting by the recreation afforded from the danger of breaking our shins, if not our necks, among the loose debris, we reach the road ere nightfall.

A PLEA FOR ALLOTMENT GARDENING.

SHEW me a man who is really fond of gardening for gardening's sake, and I will shew you a good husband, a kind father, a loving son, an affectionate brother, a useful member of society, and a man of more than general intelligence and honest worth. Such is the general rule by which I have learned to judge of my fellow-man. No doubt, this, like many other rules, will have exceptions, yet for general purposes I have seldom known it to fail, and it holds good for all men, irrespective of position, education, or age. It matters not whether it be in the narrow border which fronts the humble cot, or in the rich *parterre* which spreads itself out before the lordly hall—whether it be by the side of the village street, or the window-sill of the crowded city—if there I see the bright flowers, "the children of the sun," nurtured and cared for with the love of a devoted mother, there I at once conclude resides a man whom I gladly would call brother, be he clothed in home-spun fustain, or in good broad-cloth, for I am at once convinced that worth, wisdom, and intelligence reign within his breast.

Of all the many occupations engaged in by the human family, there is perhaps none whose moral influences are so universally acknowledged, or whose power for good are so unquestionably seen as that of gardening. I have not the least doubt in my own mind that in large cities, such as London, and Dublin, and Glasgow, if allotment gardens were more general—if they were spread regularly around the suburbs so [illegible] ous [illegible] eans [illegible] sery, [illegible] upon [illegible] than all the permis- [illegible] perance societies in the kingdom.

My observations upon this division of gardening is strictly confined to Glasgow, where I have beheld with no small pri and delight the enthusiasm that has f lowed the getting up of these allotme gardens. I have, during the last three yea been a frequent visitor at the "Albert," t "Victoria," and the "Hutchesontown" g dens there, and the benefit, not to speak of t pleasure, I have derived from these visits ha been very great indeed. I am not in a positi to say how many divisions each of th gardens may be divided into, but I thi there may be about one hundred, which v in size according to the rent paid and t position of the ground. Almost every ten has a small greenhouse, in which he cultiva whatever class of plants he is most enamou of, and with what results is better seen tha can tell, by a visit to the exhibition tables the Glasgow and West of Scotland Ho cultural Society's shows. In almost ev case—in fact, I may say in every case—the p ducts of these gardens are the results of ea morning rising and evening labour. T lessees are mostly all engaged in busin during the day, and not a few of them hard working mechanics, who toil hard a heavy with the hammer from six till six. T rest are the smaller merchants and ma facturers, as well as a goodly few of th clerks and shopmen.

Confined, as they are, from day to d from week to week, and from year to y within the city's din and bustle, pas one-half of their lifetime in an imp and unwholesome atmosphere, what can more healthful or ennobling for them t thus to pass an hour or two every even in tending their "little gems" with water-pot; in dressing and cleaning t beds or borders, or in planting or tending vegetable department? For it must be bo in mind that there is scarcely a departm of gardening neglected when we come to l through what I may call one of these e blishments of gardens. I have often contras

ence between the mechanics and
ave seen thus engaged of an even-
those that are nightly to be seen
g the tavern and ale-house. The
all the strength and vigour of man-
ming from his bright eye and rosy
he pursues his evening occupation,
ing and happy wife looks with plea-
lelight at the work of her husband's
l as she sits upon the seat at the end
k, it may be with a prattling, lisping
heaven's own giving upon her
coos and laughs with delight when
ulls for him a flower, thus giving him
sson in love for the beautiful; while
ranches of the parent stem gambol
t little houses with the gravel under

Change the scene to some of the
the city; there you find dozens of
classes gossiping about the corner
et or the entrance to some of the
amusement; the mechanic dirty-
d begrimed, it may be, through his oc-
his beard unshaven and hair in dis-
bably less or more under the in-
drink; the clerk or shopkeeper a
r the same influence, and although
y be clean and coat tolerably good,
s that unhealthy and "seedy" ap-
pervading his whole exterior and
ich clearly indicates the want of
ercise and recreation, and plainly
t the manner in which he spends
ime is not in any way calculated to
the evil tendency his daily occu-
ds to bring upon him.

homes of the two classes to which
rred prove exactly the same thing;
wer or waving fern, or a few cut
ace the window, table, or mantel-
e one, while the whole house has a
mfortable appearance, bright faces
smiles meet you on every side,
ne you in. In the other, there is a
nd repugnance about the whole
those who love and enjoy such a
as I have described. On the
the fire there is an empty chair,
r thereof having gone in search of
lds and pastures new," while by the other side is seated a wife, whose life is almost a void. There she sits, day after day and night after night, with her little ones, care pictured in her face, and a premature weight of the world upon those around her. Such, I make bold to say, is often, very often, the different pictures which may be drawn of those who had the same opportunities of succeeding in the world; who may have been schoolfellows—nay, may even be brothers, and whom surrounding circumstances, in early manhood, may have driven into different roads.

Seeing such to be the case, and believing, as I do, and believing, as many who have the well-being of their fellow-men at heart, that a love for gardening would obviate much misery and crime, and even mortality, it is the duty of every one who has the means, to try, as far as possible, and bring about this grand consummation of things. The next question which presents itself, however, is, By what means can this be done? I will try to answer this to the best of my ability. Let those who have the means and the heart—for without the heart the means will be of little avail, and plenty of such there are about all our large cities and towns—try to bring the more humble classes more to appreciate the beautiful and grand in nature, by subscribing and buying or renting pieces of ground at convenient places all around, offering these at first at a mere nominal rent, and, if need be, even buying and distributing flower seeds to the poorer classes. Let the gardens be regularly attended by a deputation or committee of the proprietors, who shall give advice, encouragement, and, if need be, help to those who may require it. Let small prizes be from time to time given for the best kept plot, or for the best plant or vegetable of one or many classes, and these prizes I would recommend to be given in books bearing upon gardening, and more particularly those bearing upon cottage gardening. If this, or some other plan having the same object in view, were adopted in all our cities and towns, I have great faith in the "transformation scene" which would follow. Although there might not be the same return for the money expended, in a commercial point of view, yet I believe in the end there would be a great decrease of poverty, pauperism, and crime, and, as a consequence, a great reduction in poor-rates and police taxes. I would even go the length to believe that the reduction of these would do more than cover the first outlay. Be this as it may, there can be but one opinion about the beneficial results which would flow from the system, and if he to whom the riches and blessings of this life are given in abundance cannot stoop to let a few of the passing drops fall upon a needy brother, he is unworthy of his trust, and not putting it to the use for which it was intended.

If this system were adopted, not only would it tend to make men more moral and sober, but it would also increase their knowledge, strengthen their minds, and elevate their thoughts. These are the attending benefits which flow from, and are the attending accompaniments of, a love for gardening. To watch the new-born daisy spring to birth from out the fresh green sward—simple though the flower may be—has a tendency to elevate the mind, and raise it far above the thoughts of time and its transitory visions. We may look upon it as a very simple matter, the springing and flowering of the "wee modest crimson-tipped flower;" but the man must be very void of reflection to whom at some time the question did not recur, How came this flower to be here? did it spring sponta life? A little consideration would s that both of these hypotheses were wı that it must have been placed theı and insignificant though it may ap some great master mind whose creati is absolute, and without whom nothi exist that does exist. If thoughts this are daily passing through the many—and I believe they are—of tl are engaged in the pursuit of hoı what must be the thoughts whic hourly crowd the minds of those wh first time, would engage in the culti flowers. There is no department (science more replete with knowle pleasure, with a greater elevating ten a more edifying and instructive nat that of gardening; for, as the poet h fully said—

> "Lo, on each seed, within its slender ri
> Life's golden threads in endless circles
> Maze within maze its lucid webs are r
> And as they burst the living flame unl
> The young narcissus on its bulb compr
> Cradles a second, nestling on its breas
> On whose fine arms a younger embryc
> Folds its thin leaves and shuts its flore
> Grain within grain successive harvests
> And boundless forests slumber in a sh

Should the foregoing prove a sti incite anyone to attempt the obje at, the writer will not consider l lost.—*J. M'M.*

ADULTERATION OF SEEDS.

W[illegible] trade which de[illegible] see it. [illegible] ones [illegible]

[illegible] suffering from a bad tooth. [illegible] *aries* of old date. From some allusions [illegible] older books, it would appear that the decay had already begun a hundred years ago. Latterly it getting more and more painful to bers of the trade, and offensive to whom they come in contact. Smar ts twinges, some of them made a couple of years ago, to get the re body to agree to have it taken out. could not muster courage, and th ended in the postponement of th Meantime their neighbours have st

ticultural Society has interfered
in the capacity of a Humane
They volunteered to take out the
ther the trade like it or not. They
e nothing for the cure, but cure it
nolens volens. The trade have met
osition with passive resistance.
ther kicked, nor hallooed, but
ed their lips. Wise in their genera-
were dumb, and they opened not
th. A dentist has rather a hard
his patient refuses to gape. But
cultural were not to be so put off.
e their approaches gradually, begin-
eeling their patient's pulse, which
y loud and irregular. They went on
into the symptoms; and as the
nself would tell nothing, they got
is friends or servants to do it for
en, making a sudden plunge at the
aged to give it one or two hearty

hey could get it out, however, the
ggled out of their grasp, and we
l the present position of the parties
the Horticultural have got their
patient pinned up into a corner,
odging round him looking for an
make another rush at the broken
has been terribly loosened by their
pt, and if they can once again
t, there is little doubt that they will
. It would be an immense relief
ient if it were out, but in his pre-
ion, with the gum sore and bleed-
ery savage, and by no means dis-
bmit to further handling. In the
it seems that some of the members
have called in another doctor of
o class, who proposes to stop up
y Act of Parliament. It is to be
place, but by filling it up the
ot to suffer any more from the use
r dyed seed—two deleterious sub-
the fondness of the trade for which
o attributes the present decayed
tooth in question.

gory is simple; all our readers
pplication. The seed trade has
een in the habit of mixing dead seed with good, to increase its quantity, and of otherwise manipulating it; and it seems the chief agent by which the practice has been countenanced and encouraged has been an association of the wholesale seedsmen in London, who have managed to enrol almost every man in the London trade among their number, and so have given a uniformity to their actions which has made itself felt all over the kingdom. Various attempts have been made from time to time by their own members to get the association to abstain from countenancing or directing this system of adulteration, or "lowering the averages," as it is more euphemistically termed, but without success. Latterly, as noticed in our last, the Horticultural Society has moved in the matter, and published two Reports from a Committee which conducted the investigation. The first proved the existence of the evil by giving the results of trials of seeds obtained from most of the wholesale seedsmen in London; the second revealed the action of the association by which it was systematised. Since the publication of these Reports, the Council have had an interview with Mr Bright on the subject, and, moreover, a bill to check the evil has been brought into Parliament by a number of seedsmen, making it penal to sell killed or dyed seeds, the second reading of which has been fixed for 16th of June.

What may be the fate of this bill, or what the action of the Board of Trade consequent on the appeal of the Horticultural Society, or the future procedure of that Society itself, remains to be seen. Our own impression is that the only one of these which the dishonest tradesman has to fear, or the honest one to hope from, is the Horticultural Society. The bill is a mere palliative—we should almost call it a blind—full of sound and fury, signifying nothing—charged with penalties for offences for which a conviction would almost be impossible, and leaving untouched the only fair and true means of dealing with the sale of bad seed. By it, whoever shall *knowingly* sell killed seed is liable in a penalty of £50. But how is this seed to be proved to have been killed? There is no microscopic or other test by which killed seed can be distinguished from seed which has died a natural death. How is it to be proved that the dealer knew it to be killed, and why is the sale of *killed* seed to be the only offence punishable? If, instead of 1 lb. of good seed, the purchaser only gets a ¼ lb., what does it matter to him how the unproductive three-fourths have come to lose their vitality, whether by killing or by age. If the promoters would add a short clause, to the effect that all seeds which, on being tested, do not contain 75 or 80 per cent. of good seed shall be held, for the purposes of the Act, to have been killed, and every dealer who sells them shall be held to have done so knowingly, then the evil would be touched, then the Act would become something more than a name. But it would not pass. John Bull is only waking up the evils of adulteration; nothing in the way of effective interference has ever yet been proposed by any Government. Anything like Governmental tampering with the free course of trade has always been regarded by all parties as dangerous; therefore, we do not believe that a really stringent bill has any chance of passing through Parliament, even although Government should stand neutral, which is not likely to be the case.

For the same reason, we have not much expectation of any effective interference on the part of the Board of Trade—at any rate at present. That ere long a change will take place in the traditional policy of Government in this respect, we do not doubt, but public opinion is, as yet, only ripening towards it. The feeling of annoyance and disgust at the open and lawless violence of the criminal classes is giving rise to a stronger and stronger conviction, that to retain the greater blessings of freedom we must part with some of its exuberance; to preserve its essentials we must risk some of its accessories. Action upon that feeling, however, has yet to come. If the Board of Trade proves a broken reed, the only staff which remains is the Horticultural Society, and we look with considerable confidence to them. What they have already done has been done steadily, determinedly, [illegible] and what is almost of as much importance in such a matter, it has discreetly and temperately done, and we reasonably anticipate that the same which has regulated their past action wil prevail in any future steps they may take

And here we may be allowed to say the trade themselves, and more especial association of London seedsmen, kn what they did know, have not played cards well. They knew that they he indefensible position, and should have terms before the attacking force knew i Any one who takes the trouble to rea First Report of the Committee of the cultural Society, will see that they wer ing in the dark, and that they then kne thing of the concerted operation of the men's Association, or of many of the evils which have since come to light. A stage they invited the seedsmen to meet and join them in a common effort to guish the evil. How should this overture been met? Were it not that *quem Deu perdere prius dementat*, one would have th that the blindest would have seen th hour had come to set their house in It did not come upon them at all una They themselves had previously had it consideration, and yet, when the oppor of avoiding all this scandal which they must be disclosed, presented itself to hand, accompanied, too, with the gre vantage of having a share and a hand in ing the future rules for the trade, they al it to pass by. That is all we can say-allowed it to pass by. Why they did do not know. They have not told, an Horticultural Committee have not tol is rather remarkable, indeed, that i Horticultural Committee's Second Rep mention whatever is made of the seed or of any meeting with them. Thei Report concludes with an invitation trade to meet them, and to consult tog and either in the *Gardeners' Chroni* somewhere else, we observed it incide noticed that a meeting had taken What was done or said then? As the S proverb has it, "Hay un gato encerrado there is a cat shut up here—and as n

io were present seem willing to let it
he bag, we can only exercise our
y as to the cause; but no ingenuity
d as to the fact, that nothing was
r the seedsmen upon it. We say
was madness to hold out. Could
pose that the truth would not leak
ould they imagine it would not be
to them and the rest of the trade,
would be possible for them to carry
old system after it had once been
blic? It would be absurd to suppose
imagine they have recognised their
this time. Unless we are misin-
ndeed, they have themselves resolved
on the system of fixing averages. If
o, or indeed whether it be so or not,
ey not even yet to try to recover
sition—to re-open negotiations with
icultural, and unite in devising some
le scheme with the *bona fide* object
g down the sale of bad seed.
what we see recommended in other
hich may indicate the set of the cur-
men's minds, the course the Horti-
vill have pressed upon them will be
inuation of their testing of seeds,
nied with the publication of the names
from whom they get them. In the
is probability, would it not be better
seedsmen to meet the contingency
, and make the testing voluntary?
sman was so secure in his honesty
ould say to the Horticultural or any
stworthy body, "Come and visit my
ment at any time; every sack, every
very repository will be open to you;
t seeds you like; test them, and
he results"—would such a man's
ot be made if the results were good?
ry seedsman can tell beforehand
he would be safe to run the risk or
good men of business test every
seed that enters their warehouses,
hemselves give the average of every
eir place. It is done every day in
ns between seedsmen themselves.
s the average of this parcel?" and
er is ready, "45 per cent.," "75 per
85 per cent.," as the case may be; and each has a price corresponding to its quality.

But it may be said that no man's stock can be in such a perfect condition as to allow of this being done. Some rare seed has, perhaps, been bought at a high price. It has lain on hand, and is, perhaps, a dozen of years old, and yet the holder does not like to throw it away. True, but in such a case he can limit his invitation to inspect. He may restrict it to agricultural seeds; he may limit it to a single kind of seed. It would be more difficult, no doubt, to obtain satisfactory assurance that all that he possessed was really exposed to his visitors, and their certificate would state that circumstance; and it might be that they might decline to test at all. But in the majority of cases—as, for example, in large establishments, where whole granaries are piled to the roof, and the visitors turned loose into them—it would be no difficult thing for men of the world, knowing something of the subject, to tell at a glance whether the invitation was *bona fide* or not. Other objections might be made as to the length of time for which the certificate should be held good; but it would be easy for those who are willing to do so, to devise a remedy for such difficulties. We do not offer our suggestion for more than a hasty hint thrown out to those interested, which, by being turned over and put in shape by different minds, might perhaps bear practical fruit. One would think from what we have said as to the knowledge of the quality of their seeds possessed by the seedsmen themselves, and the recognition of different prices for different qualities, that it must be a matter of perfect indifference to the wholesale dealer whether the seed has its average lowered or not. So long as he deals only with dealers, and so long as the proportion of price is duly preserved, it must be so. It cannot matter to him whether he receives 20s. for 1 lb. of seed wholly good, or 10s. each for 2 lb. of seed whose average has been lowered to 50 per cent. His advantage should rather be with the good seed, for then he would be spared the expense of diluting it, and smaller premises and less work would be required

To make it any inducement to him to continue the practice, he must deal also with the public without making sufficient allowance for the inferior quality. That is a source of profit which must be given up. The public must, somehow or other, now be dealt with as much on the square as the trade is (making allowance, of course, for the tradesmen's profit). If the public want nett seed, they must get it, and must pay the price for it. If they want cheaper seed, they must be told it is not nett, and how much below it. One immediate result of the late disclosures will be to raise the price of seed to the public considerably, and this, we are afraid, will happen not only to the seed which has usually been lowered (where the price *ought* to be raised, if the quality is improved), and also to seed where no change has been made. The honest trader will add the necessary price required to make his seed nett seed. The dishonest will heighten the price of everything, on pretence of the seed being better, and may leave it much the same as it was before. Here is an occasion where the association might come in most usefully to help the public. They could tell which seeds ought to bear a higher price than formerly, if sold nett, and they ought to do it. They owe something to the public to recover their *prestige.* They think that they are entitled to, or at least they claim, credit already for having, in past times, by their operations occasionally preserving for the general public a share of seed which was running short, and which would have all passed away into the hands of a few first comers, had they not "taped" it out among many by diluting it to all. But the public will not admit this as good service, or as good [illegible] failure of any [illegible] ver[illegible] for [illegible] actually [illegible] itself always rights itself, and any attempt to assist or control is false political economy.

If the association would abandon such [illegible] start upon the opposite principle of allowing no man to belong to it w sells anything but nett seed, they would s retrieve their position, and make it an hon to belong to it. If they will not, we co predict with safety that if a rival associat were now to start upon the above princip courting the light instead of seeking d ness, being stringent in their rules against a teration, and expelling whoever infringed th its members would be certain of support.

The evils of an increased price without proved quality will, however, only be tempor and of partial operation. The benefit of proved quality will be general. Private tr will become more common, and will serv keep fraud in check. The honest dealer retain as usual his superiority, and end driving his dishonest competitor out of field. If ever there was a time when hone is the best policy, it is so now for seed trade. The public have bec aware how things stand, are prepared an increase in price, provided only t can get an improvement in quality. are surprised that the craving of the pu for a better quality has not been turned advantage by more houses long ago. I notorious that those who wanted first-c seeds went to the Continent for them. vegetable seeds sent out to their Fellows the Horticultural Society have long been nowned for all coming up. For thirty y back they have been got in Paris. It is long since the East India orders to our L don houses were very large; now t are comparatively small. The fact this: when complaints were made the quality of the seed, the blame thrown on the passage down the Sea; but better seed was sent for a ti By-and-bye it became as before, and inst remonstrating any more, the orders w simply sent to Paris instead of to London.

The system has thus been injuring trade most seriously, and it is a most fo nate thing for it that this clearing of the has taken place. They have now got a fr start, and it will depend upon themse whether a course of prosperity or discr attends their future.

HOG CHOLERA.

EARL COWPER, in the House of Lords last week, asked for information concerning the reported prevalence of hog cholera in America. Earl de Grey, in reply, quoted from a letter of the British Consul at Buffalo, dated March 20th, to the effect that the malady was widely prevalent among American swine. The disease, it is stated, had been detected in a large drove which reached Buffalo on the 12th of March, in transit for New York. About fifty of the drove were found to be infected; and several had been sold upon the spot before discovery was made. The flesh of the diseased hog, it was added, is totally unfit for human food. It is to be regretted (says the *Lancet*) that Earl Cowper did not ask if hog cholera was prevalent in any part of Great Britain at the present moment. The disease is one of the most fatal epizootics from which swine have from time to time suffered in these islands; and our knowledge of the malady is far from satisfactory. It has been variously termed by different veterinary authorities, according to the view they have taken of the disease, erysipelas, carbunculosum, gastro-enteritis, anthrax, typhus, hog cholera, &c. Mr John Gamgee includes the disease among anthracoid affections. It is, apparently, characterised by signs of abdominal pains, diarrhœa, spasmodic breathing, ecchymoses over the whole body, and rapidity of progress. Mr Gamgee states that "there is marked weakness of the hind-quarters from the commencement of the attack. The animal staggers, its limbs cross each other, and at last are paralysed and cannot move." Death is apt to occur in from three to six hours from the outset of the malady. Animals which recover may suffer long from the paralysis of the hind legs or from inflammation of the joints. The appearances found after death are not uniform. The most constant are great congestion or ecchymosis of portions of the tract of mucous membrane. In some cases the respiratory, in others the intestinal, portion is the chief seat of pathological change, and at times the substance of the lungs and of the liver is deeply affected. Ulceration of the intestinal mucous membrane has been recorded; and, but for the rapidity of progress of the disorder, it might be thought that instances of the typhoid fever of swine, so graphically described by Dr Wm. Budd, had been included amongst the examples of hog cholera, properly so called, the symptoms agreeing in several important particulars.

Dr Sutton, of Indiana, in an account of the epizootic, has related several instructive experiments, shewing the great contagiousness of the disease; and Dr B. W. Richardson, reviewing Dr Sutton's paper, pointed out the resemblance of the malady in several respects to scarlet fever; and suggested certain experiments with a view of testing the question (*Sanitary Review*, vol. iv., p. 241).

In the event of the hog cholera again becoming prevalent in this kingdom, the course of action, as deduced from previous experience, should be precisely what the country was taught by bitter experience in respect of the cattle plague. That course is at once to kill the sick animals, separate the healthy, disinfect piggeries, and exclude all new stock, except after a prolonged period of quarantine.

Portraits of Domesticated Cattle.

FOREIGN BREEDS OF CATTLE.

NO. 2.—THE CHAROLAISE.

IN fig. 1 we give an illustration of the Charolaise bull, and in fig. 2, of an ox of the same breed, which is known in France as, [illegible]signated as the [illegible] shorthorn [illegible] white colour. The animals of the breed are often symmetrically formed, compactly built, with straight backs and fleshy necks. In the cow, the dewlap is not much developed. The head is large, the horns being thick at the root. The hair is long,

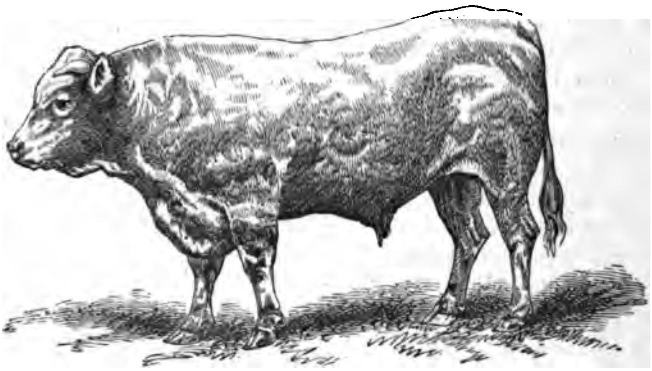
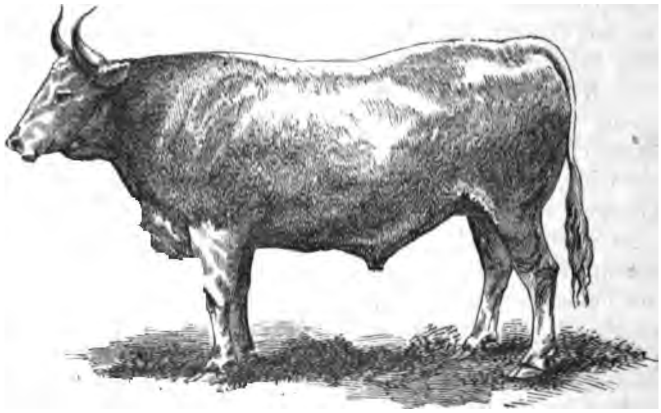


Fig. 1.—Charolaise Bull.



[illegible]aise Ox.

rly. But those having a brilliant
ought so valuable, being con-
ifficult to fatten. But although
with good characteristics, they
s frequently to be met with with
osite kind, as with narrow rumps,
oulders and elbow joints, and with hollow backs. These defects are often got rid in a very satisfactory way, by a cross with the English shorthorn, a cross, however, which seldom perpetuates the peculiar colour of the Charolaise breed.

The habitat of the breed is the upper valley of the Loire.

POINTS OF THE SHORTHORN COW.

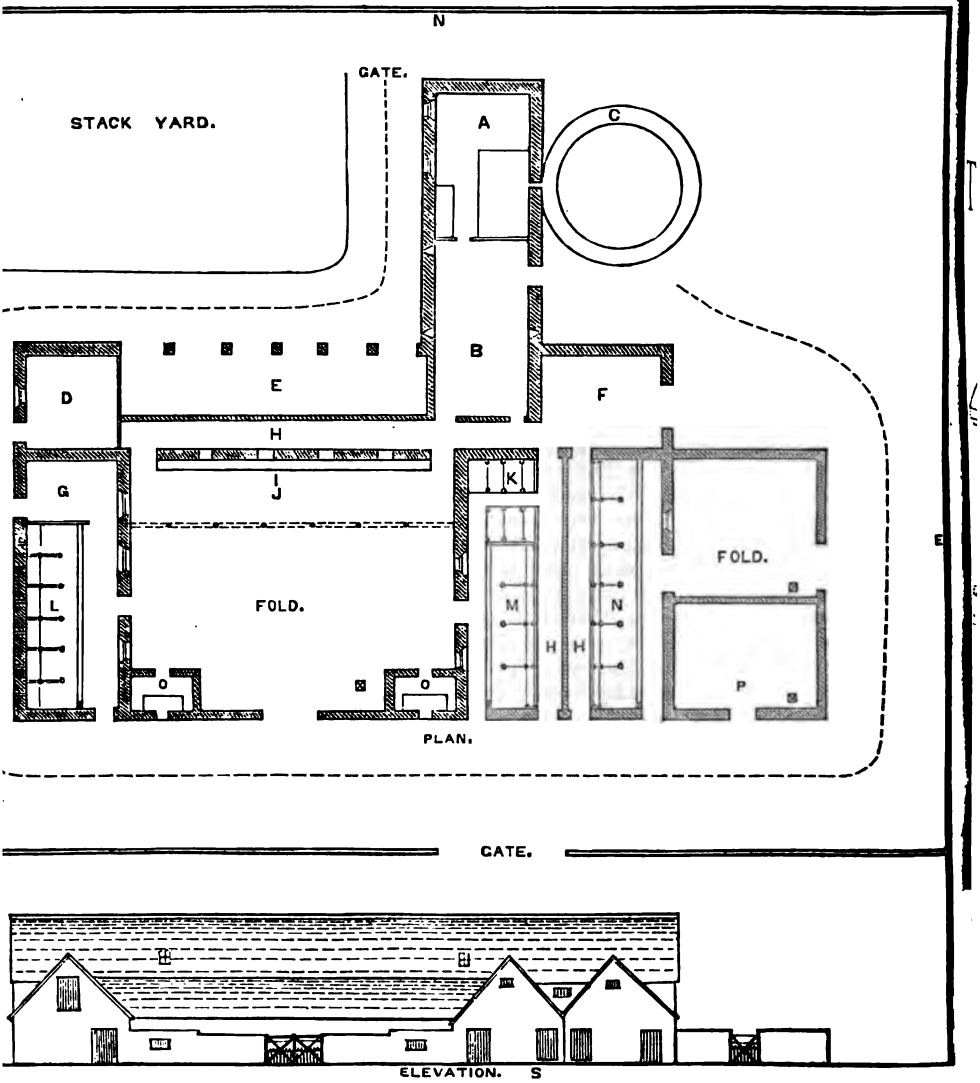
pt to sketch, saysan authority, an ideal
ossessing all those perfect points which
much ; although most butchers like a
hich brings down the scale, yet they
greatest quantity of beef on the best
these are not to be had together, the
ed, as of most value in the market.
size is discarded, as leading to over-
animals, difficult to fatten. On the
ttle, dwarfed, stunted animals are
voided in breeding, these appearing
healthy constitutional stamina which
rthorns is so highly prized. Those
d, as they occasionally occur in herds
lose breeding, as well as from food or
from local causes. The shorthorn bull
metrical form ; of medium size ; body
rs and neck) rather long than short ;
hort ; all choice parts well covered with
nd fat mixed, not patchy ; skin medium
w to touch ; hair fine, silky, thickset,
not wiry ; head well set on to neck ;
e dished a little, rather long than
zzle ; open nostrils ; horns medium
and waxy, free from black stains ;
ent, bright, but placid ; the neck a
nd arched, well set on to the shoulders,
slope backwards, be broad and level,
shoulder points ; brisket deep, pro-
ad between the fore legs ; ribs round ;
quarters long ; full fleshed thighs ;
twist ; arms full above ; fine at knee ;
full ; tail well set on, at right angles
nd not thick or coarse ; colours roan,
cked ; black, or shadings of black on
, or hoofs objectionable. Altogether,
ht to have a gay " stylish " appearance
s in form, which breeders consider be-
ood, and which most animals of the
have more or less. The same characters will, with allowance for the more feminine appearance, answer for the cow, though I should add, full development of udder, not fleshy, well-set teats, good milk veins, and perhaps hereditary character for good milking qualities.

The following "points of excellence" are the careful work of a young friend who has kindly helped me. Perhaps the best way to treat them is for a few of our members to take the pleasant labour of trying the prize animals by these rules at our local shows, and reporting the result. (1.) Head moderate length, wide, and rather dished, with clear horns, and flesh-coloured nose—not black ; number of points, 4. Neck being well sprung from shoulders, and slightly arched ; number of points, 1. Neck vein prominent and full ; number of points, 2. Shoulder and crops, former being well thrown back and wide at top, "points" well-covered, and not prominent ; crops being very full ; number of points, 6. Breast coming well forward, wide and full ; number of points, 2. Back, breadth and levelness ; number of points, 2. Loin, breadth, and being well covered, not low ; number of points, 4. Hocks, breadth, and being at right angles with backbone ; number of points, 2. Rumps, not being drooped ; number of points, 2. Quarter, length, levelness, and being well filled up ; number of points, 2. Thigh, length and fineness, and being well beefed inwards ; number of points, 2. Twists, coming well down ; number of points, 3. Hock, being well bent, and not turned in ; number of points, 1. Flank, full, and coming well forward ; number of points, 3. Back ribs, well sprung from back, and round ; number of points, 3. Fore ribs, round, and coming well down ; number of points, 3. Quality and hair—Not being too thin, but soft and mellow, hair long and silky ; number of points, 4. Colour—Roans and reds ; number of points, 1. Udder and milk vessel well formed. Teats and udder—Large milk veins ; number of points, 3.

Farm Architecture.

AN IMPROVED FARM STEADING.

HE accompanying figures illustrate a farm-steading which was designed, has recently been eıected, by T. Forbes, , of Assynt House, Evanton, Ross-shire, and which presents several features of excellence. The steading is adapted for a farm of 150 acres. There is excellent **granary accommodation stretching over the range of build-**



Farm Steading at Assynt, Ross-shire.

ing, marked *d*, *e*, and *f*, and above the straw-barn *b*. Water is laid on to the buildings, and the drainage of the fold is towards the east. The nature of the ground did not admit of water being used to drive the thrashing-machine, hence the adoption of horse-power. The following is a description of the various parts indicated by letters:—*a*, the corn-room; *b*, straw-barn, 31 feet 11 inches long by 16 feet 1 inch; *c*, the horse-course; *d*, the colt-house, 16 feet 6 inches square; *e*, cart-shed, 53 feet 3 inches by 11 feet 8 inches; *f*, turnip-shed, 22 feet by 16 feet 6 inches; *g*, hay-house, 11 feet by 16 feet 6 inches; *l*, stable, 32 feet by 16 feet 6 inches; *h*, feeding-passage, behind feeding-troughs, *i; j*, cattle-shed; *k*, calves' house; *m*, byre, 28 feet 6 inches by 11 feet 10 inches; *n*, do., with feeding-passages, *h h*, behind; *o o*, piggeries; *p*, sheep-fold.

ROOFS FOR FARM BUILDINGS.

THE trusses represented in the accompanying diagrams will be found well adapted for the roofs of agricultural buildings, in possessing very great strength with a small quantity of material, being very light, and extremely economical in cost.

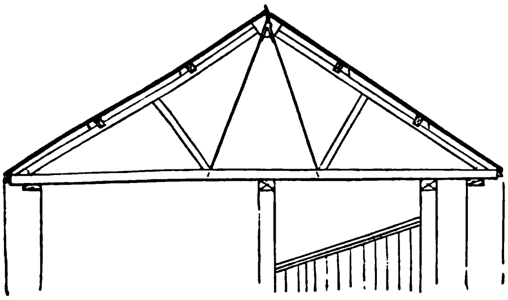


Fig. 1.

The upper part of fig. 1 is a truss for a roof of a building 16 ft. 8 in. of clear breadth, and in which there are no supports, in the length of its bearing, to the tie-beam. The truss in question consists of two rafters, a tie-beam, and two struts, all of timber. The rafters and tie-beam for a roof of the span referred to need not be more than 4½ × 3 inches scantling, and the struts 3 inches square. The top of the rafters are mortised into a hardwood king block, which will be best of elm. The struts are square, too, at half the length of rafters; a strut to each rafter. The braces are from the king block to the feet of the struts, and should be ¾-in. round iron, and the bolts fastening the feet of the rafters to the tie-beam should be ⅝-in. in diameter. The span of truss, construc

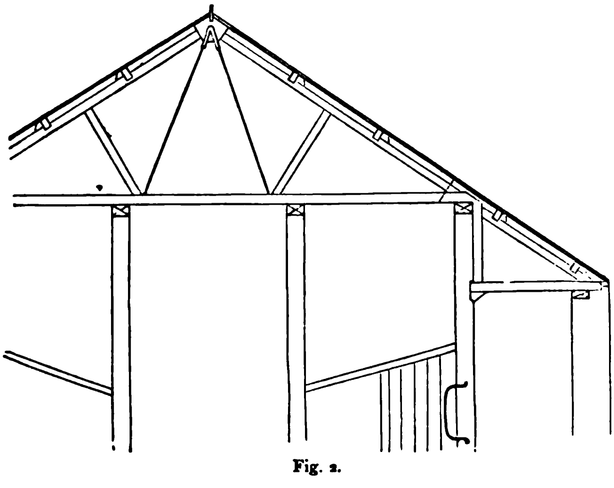


Fig. 2.

of the same size of wood and iron, may be extended to 20 feet in the clear. The pitch or rise of the roof may properly be one-third of the span or clear breadth of the building.

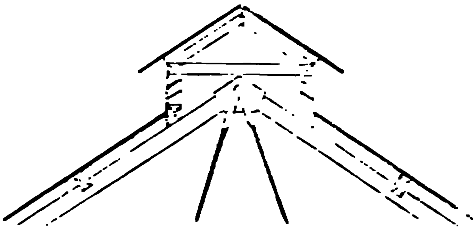


Fig. 3.

The same fig. illustrates a truss for the same span of roof as that represented in fig. 1; but it being intended to be for roof, in which the tie-beam is supported at or near its mid-length, as by a stall-post in a stable, brace-rods (shewn by the black lines) may be dispensed with.

Fig. 2 illustrates the adaptation of the same kind of roof as in fig. 1 to either a stable or a cow-house, with double row of stalls, with feeding passages at hand, and dunging passages between.

Fig. 3 illustrates the upper part, with ventilator.

The Farm.

THE NEW SYSTEM OF MANURING CROPS.

R the title of "Crops without
anure," we gave some time ago in
es of this journal, a pretty detailed
the remarks made upon the sub-
nures, the conclusions which these
the experiments based upon them
nent French scientific agriculturist,
s Ville, whose researches and ex-
have created a great deal of interest,
merica and on the Continent, and
portant papers have been published
on with the subject by the leading
l societies. Perhaps the most sug-
it is undoubtedly the most ela-
ne which has been recently brought
the auspices of the Central Society
by Mons. A. Morbaix, member of
l of that Society, and to which we
direct the attention of the reader,
promise by stating that the results
as being obtained by M. Verbat
of an extensive experiment or
xperiments carried out under the
f one of the leading agricultural
the north of France.

lts obtained, says M. Morbaix, by
by the use of the manures recom-
Mons. Georges Ville, are fully
the earnest attention of agricul-
as far as we are concerned, these
by no means surprising. They
the logical consequences of prin-
ur opinion, perfectly correct. But
slow in agriculture; the want of
owledge gives to many of our
ts some doubt as to the accuracy
o base their opinions upon scienti-
ne.

ve that, as at the present time,
periments in the manure of M. Georges Ville are being made in Belgium; it would not be without use to our readers to shew what science is now teaching upon the nutrition of plants, and consequently upon the manures which are given to the soil.

Agricultural science dates, so to speak only from yesterday; indeed, it is almost only from 1840 that a certain number of agriculturists have really had a truly rational view of it. Before that time agriculture was only a kind of technology to which true scientific principles were completely strangers. It is in the works of Liebig, Hartig, Dumas, Boussingault, Payen, and Georges Ville that we find a departure from the most homely routine, although towards the end of the last century, the works of Priestley and Sennebier, shewed plainly the great fact of the decomposition of carbonic acid, and of the fixing of acid upon the plants under the influence of the sun. Although from 1804 Theodore of Saussiere presented a theory very satisfactory on the phenomena of vegetation, the agricultural literature of the first third of this century is full of ideas worthy only of alchemists, the handers down of the science of past centuries. It is thus that we see men of a certain standing, such as Schrœder and Braconnot, establish experiments with the view of ascertaining if plants could make potash. We are tempted to admit, with Tromsdorff, that what we call azote, plays a powerful part in the formation of ashes of plants, and aiding strongly also, perhaps, in the formation of lime and alkali. But this, perhaps, is like going back to the time of Adam Smith, who, great economist as he was, had a curious notion of vegetation, when he wrote the following sentence in his immortal work upon the "Wealth of Nations;"

"The generative strength of the ground produces the fruits of the fields."

When modern chemists carry out strict investigations to build up a positive science upon the nutrition of plants, they take into consideration the rotations, tilth, or condition of the soil and manures; all these are involved in the question of nutrition; and by adding what they have written of Priestly, Sennebier, and of De Saussiere, they would seem to prove the truth of the old notions upon the nutrition of plants, that they, and not only animals, have the faculty or power of creating matter.

Modern chemistry has solved another problem of a yet higher order. We have believed for a long time that plants were supported by matter of an organic nature; that humus and its derivatives pass through all parts of the vegetable to form the tissues of it.

We know that the plant is nourished entirely by matter of an organic nature, and that plants form the great laboratory where organic matter is found to nourish the being of the animal world. With regard to the feeding of plants, Liebig has put down the following principle:—"The food of all green plants is inorganic or mineral substances." Plants live by carbonic acid, by ammonia, by azotic acid, by water, by phosphoric acid, sulphuric acid, by silicic acid, chalk, magnesia, potash, soda, and by iron.

Among all the elements of the earth, of water, and of the air, which take part in the life of the plant and the animal, there exists such a connexion, that if, in all the chain of causes which determine the transformation of the inorganic matter which is in substance susceptible of an organic activity, there came to be one link lost, the plant or the animal could not exist.

Dung, the excrement of animals and man, does not influence the life of the plant by its organic elements, but indirectly by the produce of its putrefaction and their decomposition—that is to say, after the transformation of its carbon into carbonic acid, and of its azote into ammonia (or into azotic acid). Stable-dung, which is composed of the parts or *debris* of plants and animals, may consequently be substituted by combinations of inorganic matter. Here we see that the doctrine of Liebig is just the opposite of the old doctrines.

A SYSTEM OF HUSBANDRY TO INCREASE THE PRODUCTION OF FOOD.

CHAPTER SECOND.

THE rotation of cropping to which we now beg to draw the attention of ne reader, will be found, we think, well dapted to the system of management proosed in the first of the present series of pers, and, at the same time, may be opted under a great variety of circumstances to locality and the nature of the soil. The otation referred to above is as follows, viz.:—

irst Year.—Turnips, mangold-wurtzel, or her fodder roots.

econd Year.—Barley or wheat, sown down ith grass seed.

Third Year.—First year's seedling grass, to be mown for hay.

Fourth Year.—Second year's seedling grass, to be depastured by young cattle or sheep, or by both.

Fifth Year.—Vetches mown for soiling stock, and a portion of the earliest consumed, to be succeeded by a crop of white mustard, to be used either for soiling cattle or to be eaten off the ground by sheep, as circumstances may render most advantageous. Perhaps the best application of the earliest growth of winter-sown vetches in spring would onsumption by ewes and lambs on d, if such should be a portion of of the farm.

Year.—Oats.

Year.—Potatoes, carrots, parsnips, es, that being selected which might dapted to the nature of the soil.

Year.—Peas on the lighter soils; of beans and a portion of peas on a stronger character; or beans strong soils; to be followed by crops in their rotation—viz., and other fodder roots. Wheat the next crop, if barley or wheat after such a preparation. It e so rank as to rot upon the and destroy the grass and clover n with it. To meet this objection, be a light seeding for the corn crops.

dopting the above-stated rotation of the extent of ground be divided equal portions, the proportions of e extent that would be under the lescriptions of crop in each year as follows, viz.:—One-fourth under ots or vegetables, one-fourth under e-eighth under vetches, one-fourth real grain, and one-eighth under us corn. In this division of the the ground in its application to the rops, it will be perceived that five- vould be under crops grown ex- or the keep of stock in each year. or the whole of the produce of the three-eighths of the ground might applied to the feeding of stock, very low and unremunerating price nd a high price of fat stock render urse expedient.

ion of cropping particularly adapted rease of the supply of animal food production having been stated, a natory remarks on the cultivation ication of the several crops may be for the due comprehension of the f husbandry herein recommended.

otation in question is stated to be ed with a crop of turnips or other ots.

is intended to suggest a particular preparation of tillage for one crop, and which is equally applicable to the crops in the seventh year of the rotation, a detail of such mode of tillage will be deferred for the present, in order that the subject may be fully treated of with the distinctness which its importance requires.

The variety of turnips or species of vegetable that should be grown, will depend upon the nature and character of the soil. Thus, the swede turnip, the parsnip, the cabbage, and the kohl-rabi or turnip-rooted cabbage, may be grown upon a strong soil; the swede turnip, the beet, the hybrid yellow and green-top turnips, and potatoes may be selected from for soils of medium strength; whilst potatoes, the several varieties of white turnips, and carrots are all adapted for light soils. This break of the rotation should be almost exclusively devoted to the growth of the different varieties of the turnip, except on the very strongest soils, on which, perhaps, cabbages may be found to be the more profitable crop. The other species of vegetables that have been mentioned, will more probably take their place in the seventh break in the rotation than in this. A small extent of ground should be occupied in this break by the grey stone turnip for early use at the close of summer and beginning of autumn, if it possibly can be got to grow, for cattle in preparation for being sold fat at Christmas.

The manure that should be applied to the above-mentioned crops should be a portion each of farm-yard muck, of guano, or of dissolved bones, and of vegetable ashes. The crops obtained from such a mixture of manures is invariably larger, and more healthy than with any constituent of such mixture alone. The use of guano, or of dissolved bones, furnishes a highly fertilizing ingredient to the soil in the form of phosphoric acid, which is wanting, or very sparingly contained in the best fold-yard muck.

The whole of the crop on a strong soil should be removed from the ground, and applied to the feeding of cattle in their folds and lairs. On a medium soil, a portion of the turnip crop, and the beet only, should be removed from the ground and given to cattle, and the remainder of the turnips consumed on the ground by sheep. The whole of the turnip crop on the lightest soil should be consumed on the ground by sheep, the carrots and potatoes only being removed.

The second crop in the rotation will be wheat or barley, the former-mentioned cereal on strong soil, and the latter-mentioned on free and light loam. Soil containing a large portion of siliceous sand should be sown with wheat, mixed with a portion of one-fourth to one-third of rye, by which the wheat, which is apt to lodge on light soil, is supported by the strong and wiry straw of the rye.

The ground on which the grain crop in question is to follow the previous root crop should be ploughed with a very light furrow, and the seed deposited by a corn-drill after a double bout of the harrows. If the crop be barley or spring wheat, the seeds of the succeeding grass crops should be sown at the time of sowing the corn; or, if the grass is to follow autumn-sown wheat, the grass-seeds should be sown in March, when the wheat is rolled.

The wheat crop is always much improved by being top-dressed in spring with soot; and on soils in great measure composed of siliceous sand, any grain crop is greatly benefited by being top-dressed in spring with a neutral salt of potash or soda, of which chloride of soda or common salt is the cheapest, and answers the purpose as well as any other more expensive article. It may be remarked that it is only on siliceous sand that common salt has any decided effect as a manure for wheat.

n case of the crop being barley, unless it hould be of fine malting quality, and bringing a high price at market, it would generally most profitable to grind it, and apply it to he fatt[illegible] stock in the finishing stage of th[illegible] Wheat, when selling at a [illegible] might also be applied to the [illegible]ing of stock; but it should be remembered, that this grain is very indigestible to stock in its raw state, and it should, therefore, always be cooked by being boiled or amed when applied to that purpose.

The third crop in the rotation recomme is the first crop of seedling grass sown o previous corn crop. The following fo for a mixture of seeds for one year's hay one or two years pasture on a medium is given in a very valuable essay on ' Comparative Value of the Different Gra by Archibald Sturrock, Kilmarnock, an which a premium of £20 was awarded t Highland and Agricultural Society of land :—

	Per statute a
Common rye grass seed	16 or 17
Italian do. do.	9
Timothy or catstail grass do.	2
Red clover do.	3
Alsike, or hybrid do. do.	2
White do. do.	2
Yellow do. do.	3 or 3
	39

The writer of the essay referred to remarks that "if the character of th inclined to lighter than a medium, the 2 Timothy might as well be withdrawn, least diminished, and the clovers incr 1 lb. or so instead; if, on the contrar soil approached to a clayey loam, the Ti may be increased to 3 or 4 lb. per lessening the rye-grass in proportion.

The first year's produce, if the soil be would be greatly increased by being dressed in January or early in Februar

Peruvian guano............	1 cwt.	per ac
Nitrate of soda.............	1 ,,	
Common salt...............	2 ,,	

The produce of the first year's grass be twice mown for hay for the horses and except a portion of the second crop, may be reserved for soiling the stock i the vetches be likely to run short fo purpose. The whole of the second produce should be depastured by ye cattle or by sheep.

If the condition of the soil be such justify a reasonable expectation that grasses would endure in a profitable st four years, the rotation might in that c extended to a ten years' course inste eight, and would greatly increase the for which the proposed system shou adopted; in which case recourse shou ad to another formula of Mr Sturrock for a nixture of grass seeds, and which is—

	Per statute acre.
Common rye-grass	10 to 12 lb.
Italian do.	9 ,,
Cocksfoot grass	3 ,,
Meadow fescue grass	3 ,,
Rough-stalked meadow grass	2 ,,
Timothy grass	2 ,,
Red clover	2 ,,
Alsike do.	1 ,,
White do.	3 ,,
Yellow do.	3 ,,
	38 or 40 lb.

On breaking up the second year's grass, vetches are recommended to follow, as the crop in the fifth year, in the rotation of an eight years' course. As to whether it would be prudent to sow any of the winter variety of this valuable legume is very doubtful. Where hares abound there would be no hesitation in excluding winter vetches from the cropping, on account of the depredations by these animals on the young plants in hard weather during winter; besides which, early-sown spring vetches come nearly as soon to use as those sown in autumn. If it should be decided that spring-sown vetches only should be grown—which probably would be the conclusion arrived at in most cases—they should be sown in succession, at intervals of a fortnight or three weeks, from the end of February until the end of April, or, perhaps, ntil the beginning or middle of May. As he earliest-sown portions might be consumed, hey should be re-sown, with the addition of alf a gallon of rapeseed to the seed vetches; nd the later sown portions should be succeeded by white mustard, which would be ady for use within six weeks after being own.

Should cattle be the only stock kept, the etches would have to be mown for soiling e beasts and horses in the folds, lairs, and ables. With a mixed stock of cattle and eep, a portion of the vetches would have to e consumed on the ground by sheep; and hould the stock of the farm be exclusively eep, the only portion that should be mown ould be for soiling horses. The mustard should be applied in the same manner as the vetches; and on very light land the whole of the second sowing should be mustard, in preference to any second crop of vetches, and the mustard consumed by sheep being folded upon it. Vetches may be given to cows in milk, or ewes suckling lambs, as soon as they come into blossom, but they should not be given to horses or fatting stock until the seed pods are formed. It may be remarked, that there is no field crop that furnishes so large a quantity of keep of the most nutritive description for all kinds of stock, from the latter part of spring until late in autumn, as vetches, of which, with mustard, two crops can be obtained off the same ground in the same season.

In the sixth year of the rotation, and following the vetches, come oats. This cereal is always a bountiful crop after vetches. From the shading habit of growth of this legume, and the large quantity of root and other remains left upon the ground, the soil is always left after vetches in a remarkably tender, friable, clean, and rich condition. It is the regular practice of a respected friend of the writer to grow oats in immediate succession to vetches, and the practice is invariably attended with the most satisfactory result.

A large portion of the grain of this crop would be required for the horses, and the remainder, unless selling at a high rate, might be ground down for the cows and the stock being fattened. The oat straw should be carefully husbanded to be used during winter as fodder for the young stock, and for the stock being fattened.

Following the oat crop in the proposed rotation are crops of roots and vegetables, grown in drills. The only remarks necessary to be offered in respect to these are, that the same species of root or vegetable should not be grown on the same ground as was grown upon it in the first year of the rotation.

An improved mode to that usually adopted in planting cabbages may here be noticed. It is accomplished by placing the plants in every third or fourth furrow made by a plough at about 30 inches from one plant to another in the rows. The operation of planting will be much better, and certainly much more expeditiously executed by the plough as described than by the dibble.

As to the application of the crops in the present case and their manuring, reference is made to the remarks previously made respecting the crops of a similar nature proposed to be grown in the first year of the rotation suggested.

The last crop in the proposed rotation is the pulse crop, which is supposed to follow one that has been manured for in the previous year. Whether the crop be beans or peas, it should be drilled, so as to be kept constantly hoed, and the air allowed to circulate through the crop whilst growing. This, it should be remarked, is a most important matter, and essential to success in the cultivation of these crops.

The whole of the seeds of the beans and peas should be ground into meal and given to the cows in milk, and to the cattle being fattened, as no description of food produces an equal quantity and quality of milk, nor so great a yield of beef for the quantity and value of food consumed. The straw of either crop is also very valuable as fodder, and it should be cut by a chaff-cutter, softened by being steamed, and mixed with meal and crushed linseed and oilcake, with a little common salt, to cows in milk or to cattle being fattened in the more advanced stage of their condition for the butcher.

CHAPTER THIRD.

Having disposed of the remarks relating to the various crops comprised in the rotation proposed in the previous chapters, except the description of an unusual mode to be recommended for adoption in the cultivation of turnips and other fodder roots and field vegetables grown in drills, and being the crops recommended to be grown the first and seventh years of the proposed rotation, that topic will now come to be discussed.

As early in the autumn as possible after harvest, the land on which the fallow crop is intended to be grown in the following year should be worked with at least two bouts of the grubber, and as many more as may be necessary to bring any root-weeds there may be in the soil to the surface. The soil thus grubbed should be allowed to remain untouched for a day or two to dry, and then harrowed to separate the soil from the roots, after which they should be collected by a horse-rake.

The collecting of the root-weeds having been accomplished, they may then be disposed of by any of the three following modes. They may be burnt; but when that mode of dealing with them is adopted, they should be burnt in large heaps, by which they will become charred rather than reduced to the ash or inorganic constituents, which would occasion great waste of their bulk without producing any additional efficiency as a manure. The burnt root-weeds should be carefully preserved from wet, to be mixed with guano or with dissolved bones or superphosphate of lime, to be used as a drill manure for the crops of the first and seventh years of the proposed rotation, particularly for swedes, to the growth of which root vegetable ashes are most favourable. Another mode of dealing with the root-weeds is to cart them to the homestead, and lay them in the bottoms of the fold-yards, and apply an abundant dose of salt to them, to assist in destroying their vitality, whilst the fermentation of the dung and the exclusion of air will effectually accomplish the rest towards that object. Or they may be laid on the intended site of the manure heap in the field. By dealing with the root-weeds in either of the ways suggested, these vegetable pests will be made to contribute greatly to the quantity of manure, available to maintain and increase the fertility of the soil.

The soil, being thus cleared of root-weeds, should then remain untouched until a convenient opportunity of being ploughed previous to Christmas, when it should be very deeply stirred. To render the last-mentioned operation most effective and complete, the land should either be subsoiled or trench ploughed. The first-mentioned operation should be that resorted to in the first rse of the proposed rotation, by which the soil may be stirred without being brought the surface, previous to its being saturated th atmospheric air; and the other had ourse to in subsequent courses of the rota- n, by which a supply of fresh or virgin soil uld be brought to the surface, and by ich also the depth of staple of active soil uld be increased. By the proceeding de- ibed, one-fourth of the extent of the land uld undergo the deep tillage recommended each year of the proposed rotation. The ep ploughing described being completed vious to Christmas, the land should be owed to remain *untouched* and *untrodden* n throughout the winter and spring, ex- sed to the pulverizing influence of alternate sts and thaws, until it is intended to plant sow the ensuing crop.

When the day for planting or sowing ives, such an extent of ground should be termined upon for the plough-furrows to broken down as, from the condition of soil, may be judged of as capable of being roughly cleaned and worked by the action grubbers, grubbing harrows, horse-rakes, d sometimes scrubbers, during the fore- on until dinner time; and, if it should be cessary, to hand-pick any root-weeds from soil by women and girls employed for purpose. The working of the land as scribed should always be done across the ection of the ploughing. Immediately er dinner, some of the horses should be ployed in opening drills for the manure, ich should be conveyed thereto in single- se carts by the rest of the horses not ning drills; and some of the women and s should be employed in spreading the nure in the open drills, and the rest er picking weeds out of the soil whilst drills are being opened and closed which have escaped notice on previous occa- s, or planting potato sets, or sowing icial manure by hand, should there not manure hoppers attached to the sowing s, which, however, should always be the . The drills should be closed and sown the whole extent of the land on which plough-furrows had been broken down during the forenoon, before the labours of the day be brought to a close in the evening; and so the preparation of the soil, and the sowing of the whole of the land is proceeded with and completed in portions, day by day, until the whole of the sowing of the land intended to be under turnips or other fodder vegetable crop be finished.

In the above-described practice of agricultural tillage, the process is exactly that, on an extended scale, by means of implements and machines worked by horses, and perhaps by steam-power, which is to be found practised in a similar case by the gardener with his spade, hoe, and rake, who is fully aware that no mechanical means whatever can produce so perfect a tilth in the soil as that produced by meteorological influence during winter; and, moreover, the soil so acted upon by the elements, remaining untouched until the time for sowing or planting, is in a hollow state, and proof against the pernicious effect of spring rains, which frequently cause the greatest difficulty, and often impossibility, especially on sudden drought with powerful sunshine succeeding wet, in obtaining a tilth for turnips on strong soils by the usual mode of tillage.

By the use of grubbers in working the land as described above, instead of the repeated ploughing in the usual mode of preparation for a fallow crop, the soil is perfectly consolidated without being in the slightest degree compressed, and the air is allowed to circulate through and be absorbed by the soil; by which the most favourable condition for the germination of seeds and the certainty of crop is produced, so far as preparation can influence the matter on any description of soil, but is most marked in its effects on soils of a strong clayey character.

The very great advantages of the mode of tillage above described are not a mere supposition, but a reality frequently witnessed in the practice of the occupiers of two admirably managed farms, near neighbours to each other, and most respected friends of the writer of the present series of papers, and who have practised the mode of tillage in question exactly as it has been described above for several years past, with every success that could be desired.

CHAPTER FOURTH.

As to the cost and despatch of the mode of tillage recommended in last chapter, a very great saving of both money and time is effected by its adoption. As the writer has been assured by his friends there alluded to, the cost of cultivation of the turnip and potato crops by the tillage above described and recommended, ever since it was adopted, has not exceeded one-third that which would be incurred by the usual mode; and, with regard to the despatch of the mode of tillage in question, one of the friends to whom allusion has been made, finished the planting and sowing of 38 acres of potatoes and turnips before some of his neighbours, with an equal force of manual and horse labour, had completed 8 acres by the usual mode of proceeding. The season in question was certainly a most unfavourable one for spring tillage operations, but the success spoken of under such circumstances greatly enhances the merit of the mode of tillage proposed.

The mode of tillage described in the foregoing paragraphs is by no means a discovery of recent date. It is at least as old as the present century, as it was communicated to the late Board of Agriculture in 1809 by a Mr Greg, of Coles, in Hertfordshire, as being his usual and most successful practice in growing swedes on the obdurate clay of that county. The mode of tillage in question is described in a pamphlet intitled "A System for Managing Heavy and Wet Lands without Summer Fallows; under which a considerable Farm in Hertfordshire is kept perfectly clean [illegible] productive. By Thomas Greg, [illegible] edition of this pamphlet was [illegible] London, in 1813. [illegible] the foregoing [illegible] relating to the [illegible] proposed ro- [illegible] the mode of [illegible] important in itself to be adopted independently of the proposed rotation, and may be practised with every advantage in connexion with any other system of management; and the de has been separated from the remarks to for the sake of distinctness. It be remarked, that however great mig successful mode of tillage in questi the practice of Mr Greg at the comme of the present century, it will be muc at the present day with implements better adapted for carrying it out tl then were.

At the time of Mr Greg's comm to the Board of Agriculture of his growing swedes, when the cultivatio most valuable vegetable as a field in its infancy, should not have b tensively acted upon, is not a matter of but that a mode of tillage, the pr which offers so many and such g vantages, which are not only so e monstratable, but so obvious to comm should be utterly neglected, and haver unacted upon for more than half a and, moreover, still be in abeyance, is a fact not easily to be accounted for ever, it is now to be hoped, that whei of cultivating one of the most valual known to agriculture, offering su superiority, both in certainty of proc economy over the mode usually pra Mr Greg's method of growing unque is, it will only require to be pointed ou it to be generally adopted.

If the proposed rotation of croppir extend to ten years by the sown gr during for four years, there might be no necessity for any permanent gr being attached to a farm to meet an exigences of the practice of breedi ing, and fattening of stock combin farm wholly in tillage; but with t grass in the rotation being only for t then permanent pasture, in extent one-fourth of the tillage—that is, be fifth of the entire extent of the farm— required. Such permanent pasture s adjoining or near to the homestead, used as an exercising ground for cow ture for weaned calves during the firs their existence; or with a sheep stoc ture for ewes and lambs during the or a pasture for weaned lambs until rst shear. Pasture ground applied to rposes just mentioned, would require to ssed with bones or other phosphoric :, at least once in eight years, to pre- eterioration in the quality of its herb-

:r the system of management suggested, oductive power of the soil would be- ery greatly increased; and the rotation pping proposed would enable a very tock—whether of cattle or sheep—to t. Whatever might be the quantity of the land might maintain at first, it as time passed on, progressively in- ; and whatever number of cattle or a farm of a given extent, under the of management suggested might main- ring the first course after the adoption proposed rotation of cropping, it would no means surprising should land only ondary natural quality carry a beast for every acre of the extent of the farm, reckoning all from the unweaned calf to the breeding cow and beast being fattened, the calf and mature beast both being included in the reckoning, or an equivalent stock of sheep during subsequent courses of rotation. Such a production is many times that under the very best systems of husbandry practised at the present day; and if the system suggested were to become general throughout the kingdom, the supply of animal food of home production would at no distant period overtake the deficiency which at present exists; and the supply would keep pace with the requirements of an increased population for a lengthened period of the future, and obviate the necessity which now exists for the importation of cattle and sheep from abroad, and the danger of a recurrence of the cattle plague, of which the visitation in this country has lately been the subject of the most lamentable experience.

DISEASES OF SHEEP: WORM IN THE THROAT.

[From *The Field.*]

SPECTING the development of round worms generally, and the mode entrance into the animal's system, very s known. A microscopic examination that the female parasite contains in ls of the uterus an immense number s, in which the young worms are discernible. In the mucous secretion ronchial membrane of sheep affected lariæ, eggs and young worms are nt, and doubtless in the act of cough- ny of them are ejected. At this however, the knowledge of the sub- ps short. Nothing is known of the of the eggs or the embryos after they elled from the respiratory or alimen- nal of the animals in which the parent es have taken up their residence. r the young worm when hatched lies rmant condition until it is taken up into the lungs of sheep which may be feeding on the pastures, or passes through certain necessary changes of form before it acquires a sufficiently mature organism to enable it to live and perform its functions in the organs of a higher animal, is quite uncertain. Experiments upon the eggs have not yet been attended with any definite results; if they are kept for a long time in a moist state, the embryo is hatched out, but it does not advance to a more mature form.

One fact in connexion with the history of round worms which infest horses, cattle, or sheep, is worth particular notice. Animals feeding upon lands where infected animals have previously been pastured are almost certain to become affected—that is, if the worm is of the species to which they are liable. It is known to breeders of horses, for instance, that colts are subject to great annoyance from one species of round worm which inhabits the intestines, and year after year fresh animals feeding upon the same pastures are found to suffer from the presence of the parasite, which it is fair to presume exists in some form upon the land, and is taken into the stomach with the herbage. Another fact of some importance is, that most parasites seem to prefer to take up their habitation in young animals; or, setting the question of choice on one side, the parasitic germs appear to find in the organism of the young subject all the conditions which are favourable to their development; and, of necessity, the weakest subjects most readily succumb to their influence.

Symptoms of worm in the throat.—Very little difficulty is found in most instances in arriving at a correct conclusion respecting the nature of the disease when its appears in the flock. The first and most noticeable symptom is a dry husky cough, which continues night and day; the condition of the lamb is unthrifty, the coat is rough, discharge of frothy mucus takes place from the nostrils, diarrhœa sets in, the carcase becomes more and more emaciated day by day, until death occurs. Many causes often combine to hasten a fatal termination. The weather perhaps is cold and wet, or there is a scarcity of food compared with the number of sheep on the farm; under these circumstances it is impossible to exactly determine the amount of injury which may be due to each cause, nor is it of great consequence to do so. Deficiency of food, exposure to cold and wet, and the existence of parasites in the lungs, may all be classed among debilitating influences. The real practical difference is, that [illegible] causes are removable by ordinary [illegible] the parasites are not so easily [illegible] withstanding the existence [illegible] ms just enumerated, the [illegible] not be suspected; [illegible] rtain the cause of death [illegible] animals may pr[illegible] able [illegible] opened by the shepherd, the owner looking on, and it is not unlikely that the lungs may be examined without the detection [illegible] thing to account for the fatality. If by chance the idea of the "won is suggested, it is at once negati faith of the post-mortem inspect have been made. Nevertheless, the case that the animals are af the "worm disease" although no found in the bronchial tubes. Tl do not fix themselves permane lungs; and, if animals are exam time after the disease was observe likely that no worms will be fou the mucus from the bronchial tu mitted to microscopic inspection, of the embryos are certain to be s not therefore paradoxical to state t may die from "worm in throat," a far as the unaided eye can detect are present.

Treatment.—It is easy enough medicine which will destroy worm real puzzle always is how to get th it, without at the same time sub animal which they infest to consid of being poisoned. Most interna are killed by salt, but in order to g sufficient dose of the agent the syste fested animals must often be satu it, and, in the case of sheep par happens sometimes that the anim by the medicine which was mea worm. So in reference to the des the filariæ in the bronchial tub chemical agents are most potent but unfortunately they are also the life of the sheep. Chlorine g rous acid, tar, and turpentine, are tive, in a concentrated form, to the its host alike; and therefore much quired to so dilute the agents that lose their poisonous powers in res higher animals, while they retain activity to kill the lower organisms

In all instances the most impo to attend to at the commencemen moval of ordinary causes of debil one, if the weather is inclement, th must be sheltered; if they have b almost exclusively on watery food, a more concentrated kind of nutri be supplied; all means, in fact, mus prove the general health, at the same that medicines are given to destroy the s. In order to reach the parasites in ings, it is necessary to employ remedies e form of gas, or otherwise to so ughly impregnate the system with the cine, that the membrane of the bronchial in common with other parts, will be upon. The former plan is the most cious, and, if carefully managed, the . Sulphurous acid gas, the vapour of carbolic acid, and also chlorine gas, been used with some success. Sulphu- acid is most easily applied by burning ur in a close shed and then driving the ed animals into the place; the quantity s should not be more than the operator ear without much inconvenience. It is r to keep the animals in an atmosphere rately charged with the agent for an than to be compelled to remove them ew minutes; and the great advantage of ur gas is that its strength can be regu- with ease by opening door or window. olic acid vapour may be administered rely sprinkling the agent upon the floor, or on the litter of a shed, or, better, mixing the acid with sawdust and scattering it freely about.

Salt and turpentine are given as internal remedies; but it is doubtful if anything can be gained from their employment beyond the general stimulant and tonic effect upon the system. Salt is best given in the form of rock salt placed within the animal's reach; if larger doses are required, bay salt in doses of half an ounce to each animal may be mixed with the food—bruised oats, bran, and chaff—which should be placed in a long trough for the purpose. If turpentine is used, the dose should not exceed a tablespoonful, mixed with an egg or thick gruel, three times a week.

Prevention of the disease is of much greater importance than its treatment; and to effect it care should be taken not to put lambs on low pastures, or on lands which have been previously fed off by sheep—to avoid exposure to inclement weather as much as possible—and especially to keep the animals in good condition by a liberal allowance of generous food.

POTATOES AND THEIR CULTURE.

ONSIDERING the importance of this root, and the amount of food it hes at the present day, it is a matter of se how it should have remained one ed and fifty years after its introduction into e before its value as an article of human was discovered by the generality of the e. In that curious old treatise, published in styled the "Art of Husbandry," by John mer, it is stated "that potatoes are d in several parts of the country, and hey are easily increased by cutting the into several pieces for seed—each piece ng as well as the whole potato. It is r added that they are good food for ." Kilsyth, Stirlingshire, is famous as the first place where potatoes were introduced into open cultivation. Thomas Prentice, a day labourer, raised a crop of them in a plot of ground attached to his garden in 1728, and by the annual sale of them he soon realized what was, to him, a fortune—a sum of £200. So late as 1755 this root was a rarity in Wigtonshire, and Dr Duncan tells the story of a lady bringing some of them in her pocket to church, to present to a friend, as something quite new; but the string of her pocket breaking as she was leaving church, they dropped into the passage, and the sight of them led to a great many curious inquiries. It is well certified that the date of their introduction into Somersetshire counts back only a century. In Forfarshire, again, it was the year of

Culloden before they were cultivated in the garden, and that as a great curiosity.

Now, this plant, which has been descriptively styled the " the staff of life," is universally cultivated, and will produce three times as much food upon the same extent of ground as a crop of corn. In the management of this division of the farm-crops, more diverse practices prevail than in any other crop, and it is a striking fact that in the districts where they were first introduced, the husbandmen still take the lead in the successful growth of the potato, while, in many other places, their culture is not conducted with the skill and care that might be expected. Perhaps, long observation and experience, descending from father to son, have taught the husbandmen, in the former instances, a more thorough acquaintance with practical details, indeed, the fact is beyond doubt or debate. It is also noteworthy, and is only what may be expected, that where this crop is grown systematically and extensively as a staple crop of rotation, on which the farmer depends for paying a large moiety of his rent, its culture is conducted with great skill, and heavy crops are the result. It must further be remembered that until railways ramified the length and breadth of the land, in places remote from towns and harbours, no more potatoes were grown than sufficed for the farmer and his dependents, and thus gave the grower less opportunity of acquiring that experience which larger cultivators enjoyed.

It may interest the reader to note the modes of management, especially those that commend themselves to the grower by their success in yielding large crops in several districts of England and Scotland that lie remote from one another. Renfrewshire, in the west of Scotland, has been long famous for their cul- [illegible] ago, Mr Wilson of Hurlet [illegible] of this useful vegetable [illegible] vicinity may be truly [illegible] of the United Kingdom [illegible] heard farmers of no mean [illegible] that until they were acquainted with the system pursued there, they were never thoroughly master of the details of potato culture. Several circumstances, it must be admitted, conspire to their
ful growth, that do not exist in many
A large part of the county is semi-
consequently the fields lie long in g
potatoes delight in old turf. Ag
whole, or nearly the whole dung of t
besides large quantities of town's dur
the situation admitted of cartage, ar
to this crop—sometimes as much as
an acre. A dressing of guano or so
portable manure is always added
copious doses of dung. It is further
membered that the climate is leak
cumstance that largely augments t
unless where the rains are so excess
injure the plant. It would seem
potato, in its original state, is a sort c
plant, which delights in a loose
abundance of moisture. On the b
in the valleys among the Mistylaw
hills, the soil and subsoil are for
part porous, and were it otherwise the
would be irretrievably damaged. Tl
rainfall in these western parts is ra
than 60 inches, and sometimes over 7
but the farmer will sometimes obtair
£40 an acre for his potatoes, notw
ing that amount of rain. The copi
that fall some seasons are very det
Some six or seven years ago rain t
tent of 12 inches fell in the month o
and the potato crop that year in so
tions did not pay the cost of digging

Some of the lands from which t
value of crop referred to are very in
not exceeding 20s. an acre in real va
a rich friable soil will, one year with
give more abundant crops. As a r
ever, this crop is less dependent u
and climate than the crops commo
vated. We have grown fair crops of
on ground that would scarcely grow
else—ground that for farming purpo
not yield a living to the tiller at hal
an acre. We recollect of obtaining
acre from sterile moorland, which t
claiming grew dwarfish whins and fu
grass. The soil consisted of pure
a reddish colour, and one could have
off the fibrous roots of the grass on

tcher flays off the skin of an animal.
an arid climate in one of the eastern
of Scotland, the herbage after the
f June was perpetually brown, even
the season was wet, in the technical
the term; in fact, in the words of a
book, "it never knew when good
Again, we have grown potatoes in
f a very barren description, much
g guano, very dry, in a fine state
n, and specifically light. This moor
ploughed in olden times, for it lay
crooked stiches or ridges, and was
vith worthless grass and stunted heath
first put the plough into it. Singu-
y, it would neither grow grass nor
t tolerable crops of potatoes were
from it by the use of portable
We often thought it could have
ned to fine pecuniary account had it
r Liverpool or London, for the use
cipled dealers in guano. So much
vorthless descriptions of ground on
is root may be grown; in fact, with
tion of plastic clays, it is not greatly
nt on the functional or structural
s of soils.

climate, potatoes are grown under
th a great range of temperature.
at the mining village of Leadhills,
ands at an elevation of 1300 feet
e level of the sea, potatoes are
tolerable quality, and in fair quan-
they cannot be otherwise than a
s crop at that height. Some twenty
, we saw the flock-master at Loch
ligging a very satisfactory crop of
and we tasted cakes from oats
n that farm—the only season that
ripened for fourteen years. This
ow famous as the resort of Royalty,
be 1000 or 1200 feet above the
level. Potatoes, being very suscep-
injury from frost, are sometimes
lown in the fall before they are fully
; and we have seen the tops killed
early June, and yet come away a
me to a tolerable size of tuber. In
und and low-lying situations, they
er frosted than in elevated plains, and on that account, growers, as a rule, never plant them early. A considerable breadth of potatoes are grown on moss grounds in Scotland, and the "lazy-bed" system is sometimes followed, as in Ireland. The reclamation of mosses is only practicable by the spade, for in deep mosses a long time elapses before they become consolidated enough to carry horses. It requires a great many years and the application of lime, as well as repeated manuring, to bring them to a good cultural state; but it is no doubt the cheapest plan that can be adopted for reducing the fibrous and matted mass to a powdery condition; and more value of potatoes are annually grown in the progress of reducing it to a rotten state than of any other crop that can be grown. Drainage is the first step in proceeding with moss, and it is necessarily conducted in a different way from the drainage of ordinary ground. It is subsequently delved, or if the "lazy-bed" plan is followed, which is by far the cheapest, manuring and planting are proceeded with when the season comes round. Potatoes then follow potatoes for successive years, until the obstinacy of the moss is overcome by stirring and manuring. The exposure of the tough mass to the winter's frosts and snows, and summer's sun and showers, and the effects of the shading of the ground by the shaws, subserve the same purpose. There is no better mode of improving coarse, rough, and rocky ground than dunging and setting them with potatoes on the "lazy-bed" principle. The pick, in addition to the spade, is used where stones prevail, and the work may be done by contract for £3 to £5. This scheme is practised to a considerable extent in some of the western counties of Scotland, especially in places where the protruding trap-rock prevents the free action of the plough, and in brae-set grounds where horses cannot get footing.

We named Renfrewshire and the surrounding country as being well up in potato culture; the farmers in Lancashire are also excellent growers of this root. The former has been long noted, as we already observed, for the abundant crops of potatoes produced; but, like other districts of the country, disease has appeared to more or less extent every year since the great failure. In adverting to the practice of the farmers in this western county, it may be stated that they are very particular about the strain of potatoes that they plant, and the selection of the ground from which they take them. Where the crop has been well ripened, upland farms are preferred. The potatoes grown on moss are also used for seed, if they have not been too often repeated on the same ground. After the seed is deposited in the drill—for there are none of them grown on the flat in that rainy district—the saddle-harrows are passed twice over the drills; the double-breasted plough being used for earthing up as in intermediate tillage, and care is taken to have a very thin covering of earth over them before the stems appear above the surface. The latter point is of paramount importance with the farmer, and its value is well evinced by contrast. The crop will thus come much earlier to maturity, and the produce is also augmented. When the tops appear above ground, the drills are carefully stirred with large hoes to the depth of 4 inches; this both eradicates the weeds and loosens the soil. These acts of tillage are subsequently followed by grubbing the alleys betwixt the rows, and then a light double-breasted plough is brought into requisition. They are subsequently hand hoed, and in course of time recei earthing up. It has been said, t are no gains without pains," and the farmers of the west are well earn ample remuneration from this important crop. There are a g other details in the practices of the will receive attention in our sub marks; let it suffice in the m say, that if one wants a good breed he naturally goes to the place whe to be found—so, if to learn the able management of potatoes, the cultivator visits and inspects th where the heaviest crops are gr district referred to possesses a cl industrious tillers of the groun operative farmers, who, in a most climate, and with a very indifferen higher rents in proportion to th their land than in any other part of Scotland. Medals are bestowed on soldier who mounts the breach, an life at the cannon's mouth; but husbandman—who toils with the g durance during summer's heat an cold, in a constant battle with ad mental influences during his natur more entitled to royal awards than by a temporary impulse, and for a puts his life at stake.

SEA-KALE AS A SUPPLEMENTARY CATTLE-FEEDING

THE sea-kale, sea-colewort, or sea-cabbage—Crambe maritima—which was treated of as a culinary vegetable at page 330, is not less valuable as an agricultural than as a garden plant, were its qualities generally known and fully appreciated, seeing that it is capable of yielding bulky crops of both leaves and roots, which are greedily eaten by cattle, pigs, rabbits, and other live stock; and that it thrives on stony, gravelly, or sandy [illegible] where scarcely anything deserving [illegible] ne of soil exists, and which are consequently only sparingly interspe occasional plants, and patches of st innutritious vegetation.

John Gerarde, in his "Herball" or Historie of Plants," published in L 1597, quaintly, but rightly, describe colewort, which he also named Bras Anglica, as "growing naturally upon t and brims of the sea, where th earth to be seen, but sand an pibble stones, which those th near the sea do call bayche." I

kale is most common on the
nd southern coasts of England,
as of old, on stony or shingly
which are occasionally more or less
rith high tides, but from which the
ickly percolates at tidefall, so that
ke stagnation is induced by it. Sea-
finds congenial sites among gently
nd, associated with lyme grass and
henopodeæ; but attaining to its
imensions in retired partly sheltered
ere it receives occasional manurial
ngs of stranded sea-weeds, com-
shells, shell-fish, and other remains
le and animal ocean life. It is also
n crevices and among disintegrated
cks, where it insinuates its long roots
as to draw sufficient sustaining nutri-
n such unlikely places, even in the
sons.

-kale is too well known as a kitchen
ant to need any description. When
ted, it vies in bulk of leaf crop with
kale and others of the true brassicæ,
gely spread heads of snowy white
e the favourite resort of honey-bees;
long, thick, fleshy roots, although
rought by cultural selection within
y circumscribed and easily collected
actually yield a bulk and weight
ble as well as nutritious food,
t all, inferior in acreable product
arrots or parsnips. Gardeners who
and pigs off the waste products of
ens, know well with what avidity
imals devour the leaves and
stems, and many of them may
how voraciously the latter feed
roots, in a boiled as well as
v state; while any who have
over rabbit warrens, on its native
st have remarked how these active,
, little animals devour its leaves, and
deeply after its blended nutty and
voured roots. Nor are its seeds less
ught after by many kinds of wild-
the seeds being as large as vetches,
peas, while at the same time
dantly produced than either, their
ding, oil-crushing, and other purposes, might come to be of considerable importance.

Looking at the natural habitats of the sea-kale, as well as the uses to which its products might be employed in live-stock feeding; and viewing the immense extent of utterly waste and barren surface along our coasts which might be covered with it, so as also to yield healthy vegetable diet for our numerous sea-coast population during the spring months, we think the cultivation of the sea-kale is worthy the attention of the owners or tenants of such lands.

But it is not on the sea coast alone that sea-kale may be thus remuneratively cultivated, for in many inland districts there are large extents of barren, dry, stony, gravelly, and sandy tracts, as devoid of useful vegetation as the sea-beach upon which sea-kale might be grown successfully with only the application of half a ton of agricultural salt, and a few hundredweights of light saline manures to the acre; and whether grown for rabbit warrens, or for yielding root crops in seasons of scarcity, it is incapable of being eradicated when once established, as the root mutilation, by either rabbits, the spade, or the plough, only causes the pieces that are left to become each a separate plant, and to bud and sprout forth more abundantly. Nor should it be overlooked that on many hard-bottomed, poor, sandy soils, which are incapable of supporting even Scotch firs, or anything better than bare heathery pasture, sea-kale, grown as before-mentioned, will send its roots down after the salt, through hard underlying pans or subsoils, and thus assist materially in their drainage, besides imparting a mixture of vegetable matter, which will largely benefit associated pasture, as well as after-crops of all kinds.

Transplanting one or two-year-old roots, or thongs, as they are technically called, which have been previously reared in nursery beds or lines, from seeds or root cuttings, will generally be found the most successful as well as expeditious and economical mode of introducing sea-kale, choosing February and March, or the beginning of the growi season, for performing the work, so that they will not be unnecessarily exposed to injurious tidal and windy influences, and when, from the clearing or thinning out of rabbits during the previous winter, they will be least likely to suffer from those vegetation-destroying pests. The best mode of planting is to form holes with tramp-picks or sharp-pointed iron crowbars, 12 to 20 inches in depth, corresponding with the length of the thongs, so that when these are inserted, their crown buds will be 2 or 3 inches under the general ground surface. Cuttings of strong roots, at least a foot in length, may also be planted in like manner, in the absence of bud-crowned thongs; and this will enable many who possess only small garden-plots of sea-kale to make experimental plantings at once, without having to wait till young plants are reared and nursed up to proper sizes for being put out. When the crow-bar or tramp-pick is thrust in to sufficient depth, a smart side-to-side twist of its top will widen the mouth of the hole, so as to prevent its filling-in till the plant is inserted; and if the latter be accompanied with a handful or two of rich, light soil, a more vigorous and rapid growth will be imparted to the young shoots. Although preference is here given to transplanting, it is by no means intended that it should entirely supersede sowing, when seeds can be had in sufficient quantities, and at little cost. The distance at which sea-kale plants should stand apart on beaches, downs, or warrens must be regulated by the sizes to which they are likely to attain, as well as by the intention of the grower as to whether it is to crop the ground exclusively or only partly, so as to admit of an intermixture of grass and other herbage. In the former case, it must nowhere be planted closer than about 18 inches apart, and in the latter, 3000 to 4000 plants per acre, introduced most thickly where the ground is best suited for them, may suffice to impart sufficient variety either to pasture lands or rabbit warrens.

In the exclusive cultivation of sea-kale, whether inland or seaward, much economy in labour may be effected by bearing in mind that weeds and any other vegetation may be effectually kept under by quantities of sea salt; which, while it destroys the weeds, will only increase the vigour of the kale. Half to three quarters of a ton of salt per acre will usually be found sufficient for this purpose, unless its application is immediately followed by very heavy rains; and, whether for weed-destroying or manurial purposes, it is best to apply half the quantity in autumn, when the leaves have nearly passed from maturity to decay, and the remainder in spring, before the young foliage has burst forth.

No progress seems yet to have been made in procuring improved varieties of sea-kale. This is scarcely creditable to horticulturists, seeing that it is now fully a century since they first took it under their fostering care. And whether we compare the natural growth of its foliage or roots with that of our most advanced field and garden plants, such as common and swedish turnips, the cabbage family, carrots, parsnips, mangold-wurtzel, celery, &c., in their original or wild state, we find that sea-kale presents more likely characteristic features for successful improvement, than any of those upon which cultivation and artificial selection have wrought such remarkable changes.

*ON PROVIDING A CONTINUOUS SUCCESSION OF GREEN CROPS, INCLUDING ROOTS, &c.**

By R. L. EVERETT.

THE subject about to be discussed is eminently practical, and must have ften occupied the attention of all farmers in its lation to the land they till. Stock, more specially in recent years, has been the most aying element of the farm. The farmer's ccess has consequently largely depended on e amount of stock his land has been able carry, and much careful thought has been estowed upon the means of obtaining the rgest possible yield of vegetable food. The stem which our thought and experience ave led us to adopt appears to us to possess e double merit of providing a constant ccession of green crops, and at the same me of bringing out the utmost productive owers of the land; the abundant supply of rbage enabling the largest possible amount stock to be kept, and swelling the profits the farm in this particular branch, whilst rgely increasing the general fertility of the rm and adding pleasantly to the receipts om corn.

Confining ourselves to arable land exusively—for such we understand to be the ly legitimate scope of this essay—we, at e very outset, feel embarrassed by three fficulties:—1st. There is a difficulty of imate; 2d. That of rotation; and 3d. That ising from the widely-different kinds of ock for which provision may be required.

In regard to *climate*, it will at once be ident to any one practically acquainted th different parts of this island that what is ssible and expedient in the warmer counes will often be unsuitable in those which e colder; plants which thrive well in one t being adapted for the other. A course double cropping, which will be possible average seasons in the south, will but rarely be practicable in the north; consequently, no rule can be laid down which will be found suitable in all places. And so with respect to *rotations*. The arrangement of green crops must be made to agree with the general system adopted on the farm, and thus the plan suitable for the four-course system will require some modification when applied to a rotation extending over a longer period.

The *kind of stock* for which provision is to be made must also modify any prescribed course of cropping. Some farmers prefer sheep, and some neat stock; some are breeders, while others graze, or unite the two systems, or keep principally dairy stock. We are encouraged, however, by the thought that if we can point out what is best in a certain climate, and with a certain course of cropping, it will not be difficult for any experienced farmer to adopt such system to the peculiarities of his own particular occupation. We wish it to be distinctly understood that we call that system the best which unites the most abundant production possible to the land with the provision of a "continuous succession" of green crops; and further, that we recommend nothing which either entrenches upon the usual breadth of corn or which prejudicially interferes with its production.

We propose to deal with the four-course system, as being that most widely followed, and, as we believe, on the whole the best for most occupations, whilst it is also the system with which personally we are most practically acquainted. In respect to climate, the eastern counties will be our guide. It is in Suffolk that we are now pursuing the practices we are about to recommend.

It will be necessary for us to deal separately with light soils, and those of a heavier texture, as what is suitable for the former is often quite unsuitable for the latter. We will illustrate the systems we advocate on either description of soil with an example of 200 acres of land, all arable.

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* This paper was awarded a Prize by the Royal ricultural Society of England.

LIGHT SOILS.

First, then, we start with 200 acres of light, tender soil, with either sand or gravel as the subsoil. Let us visit this farm in July, and supposing it to have been managed as we recommend, the respective shifts will then be occupied as follows, viz.:—

50 acres with wheat.

50 acres with roots, thus apportioned: 20 acres beet after rye; 26 acres swedes after trifolium; 4 acres tares, followed with late common turnips.

50 acres with barley.

50 acres with clover and peas—viz., 25 acres red clover, with a little rye-grass; 5 acres mixed layer (white clover, trefoil, and rye-grass); 20 acres early peas.

We will now describe the management of this farm for the ensuing year in so far as the green crops are concerned.

The peas, being of an early kind, will be fit to "make up" in July. This operation must not be delayed till the peas are ripe, or some will be lost by "shelling out" in the necessary handling of them. Immediately the peas have been "made up," they will be moved by hand into rows, while the intermediate land is ploughed, and 2 pecks per acre of mustard seed is sown broadcast and harrowed in. This being completed, the peas will be shifted on to the newly-sown ground, while the land they have been lying on is also ploughed and sown. Thus the mustard will get the earliest possible start, which in a dry season is an object of very great importance, as in such a season the greatest pinch of feed will be when the layers are fed bare and the mustard is not ready to begin. It will be found that the peas will "make" quite well on the fresh-ploughed and, and that no appreciable injury will be done to the mustard in carting them off. Some people prefer to cart the peas as soon as they are cut, or to an old layer or a pasture, to let them "make" there; but this entails rather more labour.

It will be sufficient to deal thus promptly with about 6 acres first. If the rest of the peas are not then ready to cart, proceed to deal similarly with 4 acres more. As soon as the peas are carted, sow another 4 acres, and on the remaining 6 acres sow coleseed instead of mustard. A fitting succession of feed will then be provided. We have seen a good crop of common turnips grown after peas; but it is but rarely that turnips will mature in time to allow of the land being planted with wheat. Mustard will come to feed the most quickly of any plant we are acquainted with; it is usually ready in about six weeks from the time of sowing. It has the additional recommendation of being a remarkably healthy plant to feed off, and an excellent preparation for wheat. For the information of those unaccustomed to the use of mustard, we may say that it is best not to begin feeding it off until it begins to bloom. By that time it will often attain the height of 3 feet, and will keep running and blooming till it reaches another foot higher, and during all this time it is excellent food for sheep. A friend of ours this year mowed his mustard, and carried it home to cut into chaff with straw, as food for neat stock, and he was very pleased with the result of his experiment.

As soon as harvest is finished, work must be commenced on the wheat stubbles. We should recommend that about 20 acres be ploughed and sown with rye, which makes the earliest spring feed of any similar plant. On 26 acres—the grass having been first forked out—trifolium should be sown. For this crop ploughing will not be necessary, the seed thriving best when sown right on to the stubble. If the seed can be obtained in the "cosh" (that is, still encased in the husk it grows in), it will be the most sure to grow. Sow this broadcast on the land, at the rate of about a 4-bushel sack to an acre (equal to 2 pecks of clean seed), and harrow it well in. If the land is too hard to admit of sufficient mould being raised to cover the seed, it will be best to use the cleaned seed and to drill it, harrowing well before and after. In a wet seed is sure to grow; but in a very , unless it is covered, it is apt to be ›y the dew, and then to be dried perish, under the influence of the nd, before it has obtained a foot-soil.

e now disposed of 46 acres of ble, and have 4 remaining. Some ›tember plough 2 acres, and drill in a few winter-oats mixed to hold up The remaining 2 acres plough and : same manner in November; if ırly in the month.

for the present disposed of the ›le, we will pass over the usual rk—which does not concern our ınd suppose spring-time come. then be 20 acres of barley-stubble ith clover, which will have to be ınd drilled with peas; our own being favourable to the early a," with which we have had good

l come barley-sowing. On those ı were occupied by peas 4 years sow a mixture of red clover and vith a slight addition of white l on the other 6 acres sow white ›il, and rye-grass mixed.

ıow return to the wheat-stubbles. st be finished feeding off by the il, so as to allow of beet being : first week in May at latest. On ›ble sow about 3 cwt. of guano, ›f salt, or other manure of equal 45s. to 50s. per acre); plough arrow, and drill in beet, which we ; found thrive remarkably well ɜ land being ploughed but once as we have described. The roots larger size, and the land will be rom weeds than if no previous en grown. The trifolium can be ff or mown; but in either case ›uld be cleared in time to allow of g sown *before the month is out*, as : often thrive well if sown later. 't. of guano and 4 cwt. of salt, or manure of equal value; plough ce, harrow, and drill in swedes.

We have found the greatest success attend this plan during the last few years. We have mown the trifolium, obtaining considerably heavier crops than of clover and rye-grass on the ordinary shift; and have then had swedes to follow, which have quite equalled those grown on similar land around, which has had no previous crop. The season of 1867 was specially trying for our system. For several weeks after the trifolium was cut the weather was excessively hot and dry, consequently there was not moisture enough in the land to bring up a plant of turnips; but when the rain at length came, the seed grew, and in the month of March we finished feeding off a capital piece of swedes. We now feel assured that very little hazard attends this productive system in any season.*

The 4 acres of tares we mow for horses. As the land is cleared we plough once, roll, harrow, and drill common turnips.

We have thus sketched the needful operations connected with the herbage crop for the entire year, and may now pause to consider the succession of green crops we have provided.

January.—Swedes: we usually draw off one-third, feeding the rest on the land.

February.—The same.

March.—Beet: we usually draw off half; less on the poorer fields, and more on the better. Towards the middle of the month rye will be coming on. We either fold sheep on the beet, and give them a few hours' run on the rye, or keep them on the rye and take beet to them there.

April.—Beet, rye: towards the end of the month feed trifolium or clover.

May.—Clover, trifolium, with still a few beet, if possible.

June.—Clover, trifolium, tares, with still a few beet, if possible.

July.—Clover, second-crop clover. It is probable that a sufficient bite will not have sprung up after the scythe on the clover layers by the time the trifolium will be ploughed for swedes; it will therefore be necessary to feed some of the clover layer, so arranging that there shall be a bite on it between the time when the trifolium is finished and the aftermath is getting ready. Tares will still be good food for horses.

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* Since writing this essay we have had the experience of the past remarkable season of drought. Finding that the trifolium would be very short, we saved it for seed. This crop realized £10 per acre, and the turnips we have after it are but little inferior to the average of our neighbours.

August.—Second-crop clover, and stubble-feed, and tares.

September.—Second-crop clover, stubble-feed, with night folds on mustard as soon as it is ready.

October.—The same.

November.—Mustard and coleworts. Beet may be used now in the stalls if required.

December.—Mustard, coleworts, common turnips, after tares; swedes, if required. In the stalls swedes will now be available. If done gradually, stock will take no harm in being changed from beet to swedes, or [illegible]

We have thus provided for the entire year, and we do not see how it is possible in any other way to produce an equal weight or value of food on such land as this.

There are two or three other plants not yet mentioned which are often cultivated. On certain soils lucerne and sainfoin are very productive. When there is no pasture on a farm it may be well to keep a field laid down with one of these plants. They will both stand and be productive for several years without requiring renewal, and will often yield three or even four [illegible] in the season; [illegible]

[illegible] as to be almost sterile.

[illegible]

the place of a few of the swedes a few acres of late common turnips would probably be provided for them to lamb upon; but we believe that any deviation from the plan we have described would lessen the amount of production. Still, it is quite possible that with some kinds of stock a less weight of a different kind and at a different time might be of more pecuniary value.

Land farmed on this system of double cropping will need to be kept carefully clean; but it will be found that clean land may be kept clean in this way with very little expense.

Where a farmer has to do with *heavier* soils he will have to arrange a different system. He will not be able so easily and so surely to double-crop. For instance, if rye is grown upon a tenacious soil, it will be very uncertain whether a proper tilth can be obtained when it is ploughed for beet to be planted in, and the hazard of missing a plant of beet will be greater than the value of the rye. So neither can trifolium and swedes be depended on to follow each other. Unless copious showers fall most opportunely, the trifolium stubble will be so hard that the plough will hardly break it up; or if ploughed it will be so cloddy as to preclude any safe prospect of a plant of turnips. We have seen the two crops grown in one year on mixed soil land and both of them good, but this has been in an unusually favourable season. We have found generally that trifolium is a very difficult plant to cultivate on [illegible] soil. It does not "plant" [illegible] a "plant" *is* obtained, the [illegible] completely off. [illegible] on such lands again and again [illegible] enough to [illegible] for a crop.

[illegible] methods of dealing with [illegible] such soils which have commended themselves to our notice. The one [illegible] whole breadth to beet; [illegible] on the largest half of [illegible] cropping, only [illegible] second crop must be common turnips.

[illegible] at least in the southern

England, the heaviest and most valu-
duction will be obtained by the former
practices. Where a well-selected
the yellow globe beet (and stock is
ng with beet) is cultivated with judg-
enormous produce may be obtained.
e of proper means a full plant can
e secured ; and with an application
of guano and 3 cwt. of salt—that is,
t for manure of about 45s. per acre—
o tons per acre of clean roots will
rn in an average of seasons. In
on with a farmers' club, we have often
s crop weighed, and also swedes; in
se a quarter of an acre of *cleaned roots*
eighed. We found beet to vary from
tons per acre, and swedes from 10
ons. Here there is an enormous
ge on the side of the beet crop, which
the further advantage of being more
and, above all, the root will keep
ll the year round.

m of 200 acres managed on this
will be thus apportioned :—

res with wheat.
res with roots : thus, beet, 45 acres ;
acres.
res with barley.
res with clover and peas : thus, red
5 acres; peas, followed with mustard,
; white clover and rye-grass, mixed,

rovision of herbage-food would then
llows, viz :—For January, beet; Feb-
eet ; March, beet ; April, beet, clover,
-grass ; May, beet, clover, and rye-
une, beet, clover, rye-grass, and tares ;
ver and rye-grass, second crop clover
es ; August, clover and rye-grass,
crop clover and tares ; September,
nd mustard, and stubble feed ; Octo-
er and mustard, and stubble feed ;
er, mustard and beet ; December,

case of good land, we draw off from
to two-thirds of the beet crop, leav-
est upon the land where it grows to
ff, as we find that either sheep or
ay safely begin feeding on beet in the beginning of November. During this month and the next we feed them off just as they stand, as we rarely have frost to injure standing beet before Christmas. Those required for the next month or two, or for as long as it is prudent to feed on this kind of land (having regard to the barley that is to follow, and its needful tilth and time of sowing), we have pulled, and heaped where they grew—in November—and covered with a little straw and earth. These, of course, we have to cut and consume in troughs. For such time longer as we wish to keep sheep, we feed them in the yard until there is clover into which they can be turned to feed upon. Where grazing stock alone is kept, we believe this to be the best system possible.

But we will now detail the second plan we have spoken of, and which also has much to recommend it.

EXAMPLE OF 200 ACRES OF GOOD MIXED SOIL.

50 acres wheat.

50 acres roots : thus, 10 acres rye, followed with beet; 10 acres rye-grass, sown on the wheat in spring, and followed with common turnips; 5 acres of tares to feed, to be followed with common turnips ; 5 acres of tares to mow, to be followed with mustard (this will come earlier than the mustard after peas, which is a very important point); 20 acres beet.

50 acres barley.

50 acres clover and peas: thus, 25 acres of red clover ; 13 acres white clover, and rye-grass and trefoil; 12 acres peas, followed with mustard.

Even on the stiffer mixed-soil lands it will usually be possible to obtain common turnips after rye-grass or tares, as common turnips will generally thrive if sown at any time between the beginning of July and the end of August. In any ordinary season there will be rain enough in this long interval to prepare the land for the seed, however hard it may have been.

We shall thus have a continuous succession of green crops, as follows, viz. :—In January, common turnips and beet; February, beet;

March, beet and rye; April, beet and rye and rye-grass; May, beet and rye-grass and clover, tares; June, rye-grass, clover, tares; July, clover, first and second crop, and tares; August, clover, tares; September, mustard and clover and stubble-feed; October, mustard; November, mustard, common turnips, beet; December, common turnips and beet.

In this plan there is less weight of roots provided, but there is greater variety of spring feed and more summer supply. Where a breeding flock is kept, this plan, perhaps, will be best, especially if there be no pasture on the farm.

In all the croppings we have sketched, we have estimated that we have supplied sufficient provision of clover to keep up the usual requirement of "stover" for the horses, besides providing a constant succession of green crops for green food all the year round.

Where neat stock is kept through the summer, it is sometimes found convenient to grow a few acres of cattle-cabbages, to come in in August, September, and October, when the layers will be barest and the roots not ready. But from what we have seen we should not be much disposed to give cabbages a place in our system of cultivation, or, if at all, only upon a very limited scale. A few acres, some two or three, will, perhaps, be well. In a dry season second-crop clover makes but a short "swath," and then a few cabbages will be very useful.

CHICORY AND MANGOLD AS AUXILIARY CROPS.

AN excellent "soiling crop" which, although not much used in this country for the purpose, is worthy of having more attention paid to it, if we may judge from the great service it seems to be to continental feeders and dairymen —is Chicory. This crop is adapted to a wide variety of soils, but it succeeds best in light soils well and deeply stirred.

The present is the best period for sowing the seed; the quantity may vary from 6 to 8 lbs. per acre, and the mode of sowing best adapted to the requirements of the plant is the drill, the width between the drills being from 10 to 18 inches. The cultivation of the plant is very similar to that of the turnip or mangold wurtzel. The plants are allowed to grow in the drills to a certain stage, when they are thinned out till an interval of between 7 to 10 inches be left between each. The thinning out should be taken advantage of to weed the drills and stir the soil between them. The produce may be obtained for a considerable period of growth, affording a large harvest of produce during several cuttings in the year. When the plants cease to yield this paying amount of produce, the roots may be taken up, and, as these are valuable in commerce, they may be sold and thus add to the value of the crop. Comparatively limited as is now the growth of chicory in this country, we have no hesitation in expressing our belief that it will ultimately take its place as one of the crops upon which dependence will be placed as yielding a large amount of produce for cattle feeding purposes, and this all the more from its being so well adapted to our climate, and to the general range of our soils. The following is a result of experiments made upon this crop several years ago, but which are suggestive to us of more than one point, of this at least, that it takes a long time to introduce a product which may be new to our own system, but which is, nevertheless, of great value.

"This plant, from all I see of it, appearing to me," says the author of the experiments, "every day more and more important, I shall recapitulate here each year's acreable produce.

	Green Produce	
Sown in April.	tons.	cwt.
Cut July 24 - - - - -	9	10
,, October 17 - - - - -	9	14
Produce of the year of sowing	19	4
Cut May 21 - - - - -	12	10
,, July 24 - - - - -	16	4
,, December 3 - - - -	9	14
Produce of the second year	38	9
Cut June 8 - - - - -	18	15
,, August 15 - - - - -	19	9
Produce of the third year	38	4

was another cutting, but, in my illness,
ff's neglect, was eaten by hogs that got
closure. I can answer for the accuracy
e greater part of this experiment; and
land has not been under corn for some
ch makes even this poor wet soil
e other hand, it is much shaded to
from the sun, by a hedge 8 or 9 feet
h has been against it. However,
ely greatly on very small experi-
d therefore the reader will have
ll my larger ones are more advanced.
t No. 2.—In April I also sowed
e seed over 5 acres of barley, sown at
on a good strong wet loam, among
oil, rib-grass, burnet, &c., in order to
pasturing the field, whether sheep
would eat it as well as those other
The field was viewed by many gentle-
g a part of three years (and all
e third)—that is, the autumn after the
cut—when a fine fleece of herbage
, and two following years, once
fed through the following years.
was, that the chicory was always
heep, cows, and fatting bullocks, as
e ground as any other plant in the
or three horses were there some
made no particular remark whether
; in the stable soiling they devour it
. Experiment No. 3.—I conceived
to be so valuable, that I brought
ce, in the autumn, 20 lb. of the seed,
sown on 2 acres, with barley, in the
wing. In the following year I seeded
, in order to extend the culture
rm at a less expense. The future
be given. It is not yet thrashed.
t No. 4, also in its commencement.
ing (April) I laid with oats a 12-acre
ss, in nine divisions, each a different
seeds ; two broad lands, of about an
f those divisions sown with chicory,
with amazing luxuriance. The oats
(following cabbages, manured for),
beaten down ; they killed or damaged
hes of all the seeds, except this plant,
ced the laid oats powerfully, and
hem not a little. In autumn, fed the
heep and calves, and the chicory was
as close as any plant in the field. I
other smaller comparative trials
f which I say nothing. I make no
s on these trials. The reader will
n conclusions."

We have next to notice a very important crop, viz., mangold-wurtzel—important as being an admirable substitute for the turnip crop, which, of late years, in many districts has, as our readers know, shewn decided marks of failure. Not only is the mangold a crop which is grown with a greater certainty of success than turnip, but it produces a heavier produce of food, and is adapted to a wider variety of soils. Another great advantage which the crop possesses is its keeping properties, which enables it to be used as food nearly all the year, from season to season. It is, however, more valuable as a spring and early summer food than an autumn food. Indeed, at this latter season it possesses noxious rather than nutritious properties. The mangold, as we have said, is adapted to a wide variety of soils, although it prefers a stiffer soil than that adapted for turnips. Great care is required in the preparation of the land, as much so as in the case of turnips, the details of preparation for both crops being almost identical. The following may be taken as an example of the kind of spring cultivation required for the crop, in the case of soils of medium quality, premising that the main reliance of the farmer for that state of tilth in the soil which the crop requires must be placed on autumnal cultivation. Assuming that this autumnal cultivation has been carefully and successfully carried out, the land having been thrown up, with a deep furrow of the ordinary or steam plough, the first operation in spring is cross-ploughing, followed, if the land is heavy, with a turn of the drag-harrow in the direction of the furrows, or a double turn with a light harrow. After the harrowing is completed, the land is carefully rolled, and then harrowed twice across the furrows, which collects the weeds, which may either be burned on the field or taken to the compost heap to add to the stock of manure. The land is next ploughed across the former furrows, and then harrowed, the weeds being again collected. The necessity for all these operations, which in some cases are even more complicated, may be obviated by a much simpler, and in some cases as thoroughly and efficacious a system, by the use of the grubber. There are two varieties of the mangold grown for farm purposes—the long and the globe, the long being best adapted for light, and the globe for heavy and moderately heavy soils. The seed is dibbled by hand, or sown by the drill on the top of the ridges, the distance between the rows being usually 30 inches apart.

The seed would be the better of being damped for two or three days previous to sowing, its hard shell being thus softened, and a regular germination being better secured. The quantity of seed required is from 6 lb. to 7 lb. per acre. The crop requires a heavy dressing of farm-yard manure, which is placed on the land, and thrown into the centre of the drills, in the same way as done for the turnip crop. If superphosphate be added to the manure, the crop will be all the better for it ; nor, seeing that the crop is a sea-shore plant, should a liberal allowance of common salt be neglected to be given. The quantity of superphosphate may vary from 2 to 2½ cwt. ; that of salt from 2½ to 3 cwt. per acre.

The following are remarks from an eminent authority upon this important crop :—

"There are a great many varieties now cultivated, but those mostly cultivated are the red and yellow globe, which are most suitable for our light soils, their root not going so deep in search of food as the long varieties ; they also keep better, owing to their not being so much broken in spring. I prefer the yellow, as I have always grown the heaviest crop of them when grown side by side of red ; they may not be so good in quality, or may be of a different flavour, having observed the sheep choose to eat the red first when they were handed out to them. The long varieties require deep cultivation, but the globes will grow where any of our other roots will. I have often seen the largest mangold on the headland, and other portions of the field where it has been trodden hard. The general practice is to sow mangold on the land that has produced a straw crop the preceding year. If there is couch in the land, or if overrun with black grass or other weeds, no time should be lost after the straw crop is off in having it skimmed over. Having used several implements to perform this operation, such as Bentall's scarifier, Dean's, Savory's, and others, I find the common plough, with a broad share, to be the most efficient implement. It not only cuts off the weeds more regularly, but they are left in a better position for the drags to separate them from the soil. The couch should then be picke off, and burnt in large heaps, if weather permit but, should wet weather interfere with the burning, my practice has been, after the weeds hav lain on the surface about two months, to hav them ploughed 5 or 6 inches deep, or more, i not prevented by rocks. The land is left in thi state till March, then cultivated ; afterward apply a pair of heavy drags, then harrow onc or twice in a place, as may be needful, to separate the little live couch from the sort that ma remain, which is then picked off, and the lan is ready for ridging, which is done 27 inche apart. About 14 loads of farm-yard dung ar then put in the furrows, and 3 cwt. of guano, o equal value of a good phosphatic manure, sow broad-cast ; the manure is then covered by common plough, going once in a place in th middle of the ridge, a roller following after t compress the soil, and to get a fine seed-bed and also tends to keep the land in a moist stat The best time to sow is in the third week April ; if deferred till May, the seed ought to b soaked twenty-four hours in water before sowing. The method I adopt in depositing th seed is one of rather old origin ; but I hav always found it do well, at a very little extr expense. A man walks along the furrow with stick about 4 feet long, tapering towards th point, makes the holes about 14 inches apar giving the stick a twist, which prevents th mould from filling up the holes ; a woman fo lows, depositing the seed at the rate of 5 lb. p acre ; another woman follows, with a small ra or hoe, and covers the seed ; the ridges a again rolled. The singling out I prefer havi done by pulling them out by the hand. I ha had it done by boys and girls, at an expense 3s. per acre. In about a fortnight after the t of the ridge is gone over with the hand-hoe, second and sometimes a third hoeing is require I commence horse-hoeing between the ro before or after singling ; in most seasons I hors hoe four times. We now come to the storing the roots. I used to have the tops twisted o but now I have them cut, finding it less expe sive, and the mangold keeps equally as well."

ANNUAL AND PERENNIAL RYE-GRASS—ARE THEY IDENTICAL?

IE of the differences or disputes which occa-
ionally arise between seedsmen and agricul-
ive been so fertile in expensive and unsatis-
tigation as those relating to what, *en parlance*,
l "annual" and "perennial" rye-grass seed.
iat none of the varieties of the common rye-
either strictly annual, or decidedly perennial,
ng of it *Lolium perenne* by that most famous
ntury botanists, Linnæus, in place of retaining
name of *L. rubrum*, was, to say the least,
rtence, which has doubtless had much to do in
and fomenting many of these litigations, as
in some instances misleading non-botanical
ho in the face of much conflicting evidence,
ot unfrequently from the ignorant notions or
s of so-called practical men,) have been
y the now universally accepted specific name

This name certainly implies a permanency of
in all plants to which it is correctly applied,
adoption of it, in the present instance, by
, can only be accounted for in consequence
perenne being sub-perennial, and lasting for
ars; while all the other species of the genus
vhich were known in his day, are as strictly
any of the cultivated cereals—wheat, barley,
rye. Unlike the truly perennial common
/e-grass has no power of perpetuating itself,
underground spreading roots, or by surface-
and rooting shoots; but it forms strictly
)ted plants, which increase in bulk by the
growth of closely crowding side shoots, till,
ained to full vigour and size, they, for want
space or power for development, must
nd perish. Of this mode of growth and
have familiar illustrations in those so-called
popular flowering plants, the common daisy
rennis), auriculas, polyanthuses, pansies,
iams, pinks, carnations, &c., all of which
nce of reproduction from seed, can only be
d by occasional subdivision and transplan-
which, in like manner, any of the varieties
perenne may be permanently preserved.
miliar acquaintance with the experimen-
growth of the last, we have to add,
close cutting of their leaves in autumn
tly to cause their decay in course of the
winter, this is still more effectually pro-
allowing an exuberant or overlaying autum-
of foliage to remain, from its rotting out
, more especially in winters when deep
ail. Hence it is evident that over-roughness
rmath, or winter foggage of rye-grass, as
over-stocking of it in autumn, tend greatly
its duration; and any of these in combina-
throwing-out tendencies, and infertility in the soil, want of drainage, or other causes inimical to plant life, may result in the partial or total loss of crop, although its appearance in the previous summer and early autumn may have been highly promising. Another cause leading to even more disastrous results, inasmuch as it includes injury to, if not loss of, the autumn crop; is the production of a heavy crop of hay, and more especially if it is not cut till ripe, or past flowering; by which the root shoots and foliage are choked, so that if not entirely killed, the plants are at least very injuriously weakened.

Prominent among these natural grasses, or more correctly grass weeds, were the common quicken, the knot grass, the black squitch or creeping-rooted bent grass, and the Yorkshire fog, with some better kinds in lesser proportions, such as the hardish fescue, the rough and smooth-stalked meadow-grass, the crested dogstail grass, &c. Associated with these were such non-gramineous weeds as the creeping-rooted sheep sorrel, the prunella or all-heal, the corn mint, and others equally innutritious and objectionable; together with some of better repute, such as the white and yellow clovers. The addition to these of rye-grass must have formed an unmistakeable improvement; and the practice of sowing it rose the more in general estimation from its early and consequently strong growth, by which it gained a further repute for displacing, and ultimately destroying, some of the most troublesome and worthless of these weeds. Thus employed, the rye-grass naturally held the ground, till supplanted more or less by the better kinds of native grasses; and although it might have almost disappeared by the time when the pasturage came again to be ploughed up, it never lost its prestige for *permanency* in the opinion of the superficially observing cultivators, who, towards the end of the last century, when the more thorough cleaning of the land, by the increased cultivation of turnips and otherwise, gave indication of pretty general agricultural improvement, attributed the thinning out of two and three-year-old grass to a decrease of permanency in the rye-grass, instead of referring it to the eradication of those least strictly perennial kinds, which were previously indigenous to the soil.

The opinion that a spurious, short-lived kind of rye-grass has recently got into cultivation through the importation of foreign seed, or in some other way, was noticed and commented upon by agricultural writers in the end of the last and beginning of the present century; some of whom discovered that, besides the Lolium rubrum of old authors, another admittedly annual species had been figured and descri
by Gerarde as early as 1596, under the name of

darnel, or Lolium album. Quoting portions of the descriptions given of it, and adapting them to the so-called annual rye-grass, they made out that, compared with the perennial rye-grass, it was of stronger or more robust growth, and more hollow stemmed, in which respects it bore more resemblance to that of oats or other grain ; that it was lighter coloured, or whiter in the joints, straw, and leaves, had larger eeds, as well as longer heads or spikes, and more open spikelets. On this evidence they concluded that the mystery was solved, and the evidence was deemed so satisfactory, that something like the description here quoted was not only then, but has ever since been adopted by merely *practical* cultivators, who discard the science of botany when they have been required to give a description of what they conceive to be annual rye-grass. Yet Gerarde's description and figure, from which this tissue of supposed conclusive evidence is derived, have no reference whatever to any variety of the Lolium perenne, but undoubtedly belong to the poisonous darnel—Lolium temulentum of Linnæus—and the supposed "tares among the wheat" of Scripture, the almost complete extinction of which from our corn fields and corn samples within the last half century is the most noted example of grass seed improvement which British agriculturists have to boast of. In proof that science and sense do not yet go hand in hand, even where their conjunction might have been expected, we would here allude to an instance where a practical agriculturist of first-class eminence, who "has read some botanical works, but who has more faith in practice than in theory," and who was recently required to give evidence in a Scottish court in a disputed case regarding annual and perennial rye-grass seed, not only maintained that the description of the Lolium temulentum applied to the so-called annual rye-grass, but being shewn the different well executed engravings of Loliums in Sinclair's "Hortus Gramineus Woburnensis," and in Parnell's "Grasses of Britain," selected the figures of the poisonous darnel in both, as being the most correct representatives of the mythical annual rye-grass !

In our present remarks we must not be understood as endeavouring to imply or promulgate the belief that there are not shorter and longer enduring varieties of the Lolium perenne, for that there are so, we have had confirmatory evidence in the experimental culture, not only of the different kinds which are named in seed catalogues, but also in many promising kinds selected in rye-grass fields, as well as in those branched compact-spiked and other peculiar forms, which may frequently be picked up by way-sides or in waste places. But the actual difference of duration among them is in no case of that definite certainty, nor to the extent which is sometimes affirmed ; for in all cases the duration comes to be so much modified by the causes formerly mentioned, as well as by others, that the offspring of he same plant, whether propagated by its division or seeds, often present very different results. It may be safely affirmed that there are none
fully treated and tested the subject but will ac
the correctness of the results detailed by
in the following extract from his "Thoug
Various Objects of Industry pursued in
1790" :—"It is of late years no uncomm
find this plant, instead of continuing to sp
series of years die, after producing one c
grass had been cultivated in this country
forty years before this complaint was heard
a good many years ago experienced a fail
grass similar to that now complained of, w
sure the grass from which the seed was
formerly proved permanent ; and I have ha
mony of several intelligent husbandmen wi
have conversed, to the same purpose, som
had even been at pains to get what they
been saved from the third year's growth ; b
produced from it, on a high-lying soft so
ever subsisted longer than the reaping
crop."

The most feasible cause ascribed for the
the annual rye-grass is that of the long re
ing of its seed from first-crop hay, resultin
cess of natural selection, by which the
producing, abundantly-seeding, and, co
short-lived plants, became predominant.
of the seed for general sale was never exten
tised in the best arable districts where one
crops are most prevalent. Hence, the ch
shaken out of unripened hay and collect
lofts came to be in demand as that of a
grass ; but even this is now no longer easil
for it can seldom be got unless mixed wit
of Italian rye-grass. Dealers are c
driven to supply the demand for cheap
grass seed with the lighter samples which
out of perennial rye-grass. Consequentl
may have been the fact before Italian rye-
to be generally grown, there is now no dist
cept in the comparative lightness and h
the seed, and in attaching the name *an*
former, and *perennial* to the latter. Yet c
no means unfrequent of ignorant or u
farmers trying to throw the blame of act
posed want of crop upon the Seedsman, wi
creditable aim, it may be, than that of s
year's seed account by *per contra*, threateni
tuting an action of damages for loss, or sup
for which the Seedsman can in no way be
In all such cases judges cannot weigh the e
carefully ; and, if they are ignorant of bota
ology themselves, they would do well to d
wisely between witnesses who combine s
practice, and those mere "practicals" wh
thing of the former, and little more of the
what they may have acquired from mere h
adhered to because it was, or may have
belief of their fathers.—*From No.* 1 *of the*
and Nurseryman," a Trade Journal recentl

Notes and Queries.

THE ECONOMIZATION OF FEEDING-STUFFS.

in our last Note, gave a few remarks upon
ie cooking of food, and the diversity of opinion
art of practical authorities to which it has given
e same diversity of opinion is found to exist
ther mode of treating food—namely, pulping
pon a fair consideration of the evidence on
s, we come to the conclusion that consider-
antages will arise from the giving of pulped
feeding animals. For very full information
point, the reader is referred to vol. xx.,
of the *Journal* of the Royal Agricultural
of England, p. 458. From a paper
od authority we extract the following as
ng nearly all that can be said as to the
es of pulping or mincing roots:—"First,
of food, for the roots being pulped and
ith the chaff, either from thrashing or cut hay
the whole is consumed without waste, the
not being able to separate the chaff from the
oots, as is the case when the roots are merely
the common cutter, neither do they waste the
s when given without being cut. Second, the
dinary hay or straw. After being mixed with
for about twelve hours, fermentation com-
and this soon renders the most mouldy hay
e, and animals eat with avidity that which
ıld otherwise reject. This fermentation softens
v, makes it more palatable, and puts it into a
assimilate more readily with the other food;
his respect, I think the pulp of great value,
arly upon corn farms where large crops of
e grown, and where there is a limited acreage
rage, as by its use the pasture may be grazed,
ensive process of hay-making reduced, and
ently an increased number of cattle kept. I
e-third more, giving the young stock a small
of oil cake, which I mix with the chaff, &c.
choking is impossible, and I have only
e case of hove in three years, and that oc-
vhen the mixture had not fermented. Fourth,
an advantage in mixing the meal with the
d pulped roots for fattening animals, as there-
cannot separate it, and the moisture from the
ation softens the meal, and insures its thorough
n; whereas when given in a dry state, without
ture, frequently a great portion passes away in
nure." Another authority states, taking
systems as presently to be named, that a lot
als fed on the second system were in equally
ndition with a lot fed on the first system, though the first lot had consumed 2 tons less of roots apiece. In the first system the roots were sliced only, 34 lb. weight, 1 lb. oilcake, 1 lb. rapecake, ½ lb. bean meal. Straw is supplied *ad libitum*. In the second system 50 lb. of turnips were pulped with 1 lb. of oilcake, 1 lb. rapecake, ½ lb. bean meal. These were mixed with a little salt, and double the bulk of cut straw or wheat chaff; the whole mixed together, and allowed to lie an hour or two. Another authority recommends a thick soup of hot water and rapecake; this is mixed with chaff and pulped roots, 3 bushels of chaff; rapecake, 4 lb. The weight of rapecake at first trial is 1 lb. per head per day, gradually increasing it to 4 lb., as above. Rather more than 2 bushels of chaff are mixed with the pulped roots, and given at two feeds, morning and evening, and the remainder is given with the cake in the middle of the day. Two lb. of mixed meal are added to the trough of each animal along with the midday meal. Care is taken to have the rapecake soup boiling hot while it is poured over the chaff. Where turnips and straw or hay are alone used as the feeding materials, the quantity of turnips given at the midday meal has been recommended to be smaller than that at the morning and evening meals, as the intervals between are longer at those two last meals. The supply of turnips is given to the cattle in the troughs, which have been previously cleaned out, so as to remove all traces of former meals; after they are consumed, the cattle are supplied with fodder, straw or hay—the latter freshly made up—and the animals left quietly to ruminate till next feeding-time. The weight of turnips consumed per day by each herd of cattle will vary according to circumstances, say 11 to 12 stones for cattle weighing from 5 to 6 cwt., and 16 to 18 stones when they weigh 8 to 9 cwt. As a capital medium for moistening food, and in itself a rather enticing drink, a good deal has lately been said of "hay tea." On this the following remarks were made at a recently held agricultural meeting:—In most of the communications to the public journals on the subject of feeding stock during the winter, he found it recommended that the chaff, meal, &c., should be sprinkled with something to moisten it before being used, and he ventured to suggest that hay tea would be found very useful for this purpose, and make the mixture fragrant and palatable. His attention had been drawn twenty years ago to the employment of hay tea for pigs by reading what had been done by a gentleman in Gloucestershire, and he had used it frequently, and, he considered, with

success, for it appeared admirably adapted for young growing stock, which became sleek and grew well upon it. The attention of a French chemist was drawn to hay tea some ten years ago, and the opinion he gave as to the result of his own analytical researches was that it appeared to form "a very rational drink, which, independently of its aromatic tonic and stimulant qualities, offers to young animals, in a form which pleases them, a food which is rich in nitrogenous principles, and containing, moreover, in very considerable proportions, the principles necessary for the development of their bony structure." The process entailed very little trouble, the hay being pressed closely into a sack, which should be placed in a copper filled with water, and boiled for about half an hour or three-quarters of an hour. The better the hay the better would be the tea, and perhaps clover was the best of all to use for the purpose named. In some of the communications to which he had alluded, reference was also made to the use of locust beans, which, in conjunction with other articles, must be of considerable value as cattle food, containing, as they did, not less than 48 per cent. of sugar. A friend of his, who, like other farmers, was making preparations to meet the coming winter, told him that he had last year used the locusts for his stock, merely breaking the beans for sheep, and boiling or mixing with hot water.

XLVII. DRILLED *v.* BROADCASTED SOWING.

The following remarks on this subject we translate from a foreign journal:—We believe that carefully conducted trials will prove that greater advantages are to be obtained by the system of drilling than broadcasting. Although it may not be obvious at first sight, it is nevertheless the fact that a greater amount of work is necessitated by broadcasting than by drilling, because a small amount of work in the clearing of the land under crop sown in drills is more efficacious and more economical than a great amount of work done in a single year, and accumulated upon the single brake of the roots, or other fallow ground crops following the broadcasted cereal crops. When drill cultivation is systematically followed in a proper way, and in a favourable time for hoeing with the hand and horse hoe, the soil is easily kept in order, and, consequently, gives the produce more regularly and more independently of the seasons than cultivating by sowing it broadcast, by which the cultivator has no more control or power as soon as he has spread the seed and put it under the harrow. Above all, in a soft soil, which naturally is overrun in spring by many bad weeds, the cultivation of corn in drills ought to be beyond doubt adopted, because of the care which it gives during the early growth of the crops to destroy weeds, &c., which infest these soft soils, and destroy completely, in the course of time, the crops, by taking complete possession of the ground. Light soils, such as sandy earth, calcareous, or gravelly, are also good for drilling. The error principally committed by sowing corn in these soils in drill is undoubted of too much seed, which gives a greater plants than the soil can bear well. In these drilling in rows ought to be adopted, lowed by the systematical use of the operation which may be executed with mu effect and more frequently upon dry soils retentive clayey soils, however well dra may be. A fact too little taken into tion by farmers is that wheat, when resists dryness much better, preserves its co longer time, and gives a greater produce o light soils than by being thick sown ; and tl of seeds drilled as of seeds sown broadca error has often without doubt had an unfavo fluence upon the system of drilling. So earl M. Amos, a very clever cultivator of the las experimented on two systems of cultivatio wheat he got the following results, the the expense of cultivation being here *A hectare drilled.*—Produce—31 hectolitres at 18 francs 97½ cent. the hectolitre, 616 cent. Expense—Hire, seeds, and expenses fc tion, 161 francs 44 cent. ; balance, 255 cent. *A hectare broadcast.*—26 hectolitres at 18 francs 97½ cent. the hectolitre, 513 cent. Expenses—Hire, seeds, and expenses vation, 165 francs 85 cent. ; balance, 348 cent. In favour of cultivation in drills, 107 cent. Thus, for three-quarters of a century, d been, by experience, admitted to be more adv than ordinary cultivation ; this fact prc clearly the slowness with which agricultural ments are adopted. A similar experiment wa by M. Amos in 1791, and he got analago *A hectare of corn drilled at the distance of* 229 cc —Produce—37 hectolitres, 72 litres, at 17 franc the hectolitre, 654 francs 6 cents. Expens seed, and expenses for cultivation, 146 francs balance, 507 francs 68 cents. *A hectare broa* Produce—31 hectolitres 94 litres, at 17 francs the hectolitre, 560 francs 64 cents. Expens seed, and expenses for cultivation, 145 francs balance, 415 francs 3 cents. In favour of rows, 92 francs 65 cents. From these detai pens that of two farmers occupying the sam soil, if the one cultivates in drill he will ha vantage of nearly 100 francs for each hectar that he cultivates, more than the second farm his wheat broadcasted, which seems to prove success in cultivation does not depend so natural circumstances as to the skill with ground is cultivated.

XLVIII. SECOND GROWTH OF POTATOES FO

Some time ago a correspondent of *The Fa* gested that those who had hot-houses at th mand should test the suitableness of our pot for seed, and I have since then observed i advertisements of "potatoes for sale," whi tioned that they were well adapted for seed, being free from "second growth." Having doubts about the "second growth" ones myself, I procured a few of the second growth ones and their offspring, and a few that had no second growth or offspring, and have had them planted for the last seven weeks in one of our hot-houses, varying from 50° to 75° of heat. I beg to refer to the result, as per the following table:—

Mark.	Number of Plants (whole).	Variety.	Time Planted	Length of Stem.
			weeks.	inches.
1	6	Vt. Regents.	7	12 to 18
2	6	Do.	7	1 ,, 3
3	6	Rocks.	7	4 ,, 7

Remarks.—No 2 is the offspring or "second growth" of No. 1; were clustered together when the crop was taken up in November last, and No. 2 was then brairded some 2 or 3 inches above ground. The stems were only taken off when planted. Free from any sprout or second growth when taken up in November last, and shewed no signs of sprout when planted. It will be seen from the above table that No. 1 and also No. 2 are well adapted for seed. The stems of No. 1 came away very rapidly. No. 2 were long in starting, and I account this for their not being at maturity, but they are very strong, and now making rapid progress. Unless great care be taken in keeping them separate, the braird will come up very irregular. No. 3 being of a later variety, accounts for their stems not being so long.—*D. S.*

XLIX. SELECTING AND PRESERVING SEED.

"As ye sow, so shall ye reap"—a proverb applicable in more than one sense, but nowhere more observable than in the case of the agriculturist, who plants his seed, hoping to profit by its increase. If he sows good seed, he may naturally hope to reap a correspondingly good crop, of similar kind. As farmers become convinced of the importance of planting only perfect seed, much more attention is paid to selection of seed for the next crop than was formerly the case; but we have the evidence yearly presented us that much seed is planted that is not of the best and most fully perfected kind. Until we adopt as a system the same care and selection of growing and saving seed, that the most careful breeders of select blooded stock do in breeding for the improvement of their stock, we shall fall short of obtaining as fully developed crops as is of comparatively easy attainment. Every item of farm labour performed with care and good judgment pays well, but not one pays more abundantly than this of selecting and saving seed. The best of land, put in the best possible condition for culture, and for the best development of plant growth, with all its necessary attendants, planted with inferior seed, will fail of producing the most satisfactory crops. A vast difference is realized, whether we plant the best seed—plump, full of oil and nutriment—or blasted or shrunken, where the starch has begun to mould, and the germ of life is but just sufficient to vegetate and grow. Such seed may come up and grow, but it is tardy in coming up, and still more tardy in growing; and is also much more liable to disease, being of a weakly growth, than that from good healthy seed. There the food stored in the seed furnishes the plantlet with nourishment sufficient in its initiatory stage to start with vigour, and push its leaves and roots where they will soon begin to draw plant food from the soil and air, and thus a healthy strong growth and plant result, retaining its vigour till full development ensues. Now the proper time to select seed is while yet the crop is growing, and let such perfect itself by fully ripening; and if it be any of the grains (wheat, rye, oats, &c.), when it is cut and well cured, thrash it, and clean it by running it through the fanning-mill—having a sieve for the pupose of separating the largest and best, while the small and shrunken pass through, and the light are thrown out. Thus only the heaviest and largest seeds are saved for sowing, these being pretty sure of being the best, and of growing with a strong growth. The seed should be run through the fanning-mill three or four times, to insure perfect cleanness from foul seed, &c. The trouble of thus cleaning the seed is but little above the ordinary mode, and it insures against sowing foul seed or that which is poor; and if it only adds a single bushel of grain to the acre it pays well, for all the crop is of an improved quality, as well as the improvement in quantity, thus adding to the value of the acreable product in two ways. Indian corn is best selected from the stalk when husking, or by previously going through the field and selecting; but usually we can make the best selection as the corn is husked, if done before freezing weather, and the corn well ripened. The *best* ears in every way—those having the desirable characteristics of the variety the most fully developed—are selected. The care of seed corn does not end with the selection; for it is a known fact that the cob, as well as the grain, contains a considerable quantity of moisture, which must be evaporated, and that, unless the ears be placed in some situation where this moisture will be dried out, the germ of the grain may be injured by mould, rot, or freezing. To avoid danger of this, let the husks be stripped off, except two or three of the inside ones, and the ears braided in tresses of convenient size for handling and hanging up in some dry airy loft, where they will neither freeze nor heat (to sweat) till well cured and past danger of freezing from moisture in the cob. All this cannot be consummated without occasionally looking to it till well secured and in safety, which should be early in December. In selecting tubers and roots for planting, we are often too negligent, and especially is this the case with potatoes. Often is it the case that anything is thought good enough to plant, if it is only a potato; but we find in experience that it pays here in selecting as well as in any other seed, and that they are capable of being improved by selection and culture, as well as the cereal grains. From my limited experience and observation, I can hardly recommend the practice followed by many in cutting their seed potatoes into sets, for I have found that they invariably deteriorated, and the seed need renewing or changing frequently. The best success met with in an experience of many years, as well as observation extending over the same period, is to select for planting well developed tubers, of a size below those for the table and above the smallest, and plant these whole. I have found that better crops were realized, and the potatoes much less liable to disease and accidents, than when sets were planted. As we dig and assort our potatoes for market or family use, sort out and save by themselves a sufficiency of this size for planting next, and store them in the cellar, in barrels, ready for use in spring. Turnips, beets, parsnips, carrots, &c., should be selected when gathering and storing the crop, and they should be the finest and best-developed specimens of their several varieties. These should be packed down in sand or soil, where they will remain fresh without injury, till ready to plant out in the spring. By a careful attention to these little things in their season, the farmer is enabled to improve his crops from year to year, and thus increase his fortune; for the farmer who follows legitimate farming does not make a fortune by any sudden stroke—it is by economy in small things and by perseveringly pursuing his vocation intelligently.—*American Cultivator.*

L. CARROTS FOR HORSES.

"The carrot is the most esteemed of all roots for its feeding qualities. When analyzed, it gives but little more solid matter than any other root, 85 per cent. being water—but its influence in the stomach on other articles of food is most favourable, conducing to the most perfect digestion and assimilation. This result, long known to practical men, is explained by chemists as resulting from the presence of a substance called *pectine*, which operates to coagulate or gelatine vegetable solutions, and favours this digestion in all cattle. Horses are especially benefited by the use of carrots. They should be fed to them frequently with other food."

LI. CRACK IN HORSE'S HOOFS.

The following is Dr Dadd's treatment:—The best practice would be, first, to poultice the foot (supposing the shoe to have been removed), with a view of softening the hoof and removing any extraneous matter that may have insinuated itself into the crack. When the hoof is sufficiently softened, it should be cleansed, examined, and dressed with tincture of myrrh. Select a spot about an inch below the coronet, and with a small gimlet bore a hole through the two edges of the crack, and another 1 inch above the toe. A straight needle, armed with a strong ligature, is to be passed through the upper holes, brought over and through the second time; thus closing the two edges of the fissure by what the sailors term a "round turn." The same thing is to be repeated at the toe. The assistant, by the aid of pincers or otherwise, shuts the crack as soon as possible, the ligatures are each drawn tight, and tied with a surgeon's knot. A small quantity of blister ointment is to be smeared over the crack, and bar shoe applied. The cure is accomplished in two ways—first, by fusion; secondly, by the growth of new horn from the *matrix* downwards. After the edges have firmly united, cut the ligatures, and pare the uneven edges of the *cicatrix* level with the surrounding parts, and the cure is completed.

LII. FEEDING GALLOWAY HEIFERS.

I am feeding a nice Galloway heifer. Although quite healthy in appearance, for some time she has eaten very few turnips, and always looks empty like, and gets little or no better in condition. Besides the few turnips, she eats about 3½ lb. cake and a corn sheaf daily. What would you recommend me to give her?—*S.*

LIII. RAW AND GREEN BONES AS MANURES.

Is there any difference between the value, as a manure, of what is commonly called raw or green bones, and what are sometimes understood to be boiled or very dry bones?—*S.*

Our Library Table.

d Scutching Flax. By THOMAS BALDWIN, ntendent of the Agricultural Department of ıal Education in Ireland. Dublin : R. S. :, Lower Sackville Street. London : Simp- arshall, & Co.

s are very large, and yet contain little that ; some are very small, and yet contain this category we do not hesitate to place amphlet—for it is nothing more—before line of it is of practical value, not one uld therefore be spared ; and few as they ler ends the work with the wish that its more numerous. No higher praise can an this, and it is deserved.

diversified as are the opinions upon the x crop as forming part of the regular system arm cropping, there can be no doubt that ee in the common sense maxim, that if it ttending to at all, it is worthy of being o well. Although Mr Baldwin, like y of experienced men, believes that there is for improvement in the cultivation of the he believes there is a still wider field for nt in its subsequent management.

erage yield," he says, "of the raw material eat in Ireland as in Belgium ; while, owing ation of higher skill, the value of the dressed n 50 per cent. more in Belgium.

, then, be asked if the Belgian farmer great advantage in flax industry over the r as regards soil and climate.

t be admitted that the Belgian has an ad- he nature of his soil, which, being remark- n in texture, produces plants of uniform quality. The soil, too, being free from containing a good deal of sandy matter, is red for the reception of the seed ; hence it Belgian farmer can, when he thinks proper, ter any other crop. He is, however, most e place in the rotation it occupies, and res to grow it oftener than once in a rota- nine years. When to all this is added n the preparation of the ground and in the the seed, and that the crop invariably re- beral application of liquid manure, the e Belgian farmer becomes manifest.

tain, however, that a large area of the soil s admirably suited to the flax plant. The reland is also well suited to the crop, which a temperate and moist atmosphere, such as we enjoy. In Italy and other warm countries they can grow a greater quantity of seed, but the best fibre is produced in more temperate climates.

"In a pamphlet issued a few years ago it was suggested as an objection to the extension of flax in Munster, that the climate was too warm for the success of the crop ! That this remark is founded in error is proved by the circumstances that the summer temperature is higher in Belgium than in Munster.

"There is in Belgium a class of flax merchants, called *liniers*, who buy from the farmers a great deal of the flax as it grows in the field (or 'on the foot,' as it is called in this country), who pull, steep, dry, and scutch it, and dispose of it afterwards to the spinner. These are frequently men of capital, who erect scutch mills in close proximity to the water which they believe best adapted to the steeping process. There are also many men who buy on foot as much flax as gives employment to themselves and their families in steeping, scutching, &c., during the year.

"This class of persons is most useful in Belgium, and would be equally so in Ireland. They insure to the grower a ready market, and, generally, a remunerative price. They relieve him of the care and risk consequent on the steeping, and they leave him free to devote his skill and energy to his farm operations. By introducing the division of labour into the treatment of the crop, they secure to the spinner a fibre of superior quality, obtain for it a price which amply repays themselves, and add to the general wealth of the kingdom.

"If a class of persons would engage in a similar trade in Ireland, they would soon establish flax as a staple crop in the south and west. The small farmers in those provinces are generally in want of capital, and cannot be expected to embark in the cultivation of a crop for which there is not immediate sale. The liniers would completely meet this difficulty.

"The flax spinners of Belfast, who are most solicitous about extending the cultivation of flax, would do well to encourage this trade."

We have said that the pamphlet is full of practical matter. Take, for example, the following as the time for pulling the crop :—

"The proper stage in the growth of flax at which it should be pulled has been the subject of much controversy. When, as in many parts of the Continent, the seed is the principal object of the flax-grower, there can be no doubt whatever that the plant should be allowed to mature the seed ; but it is well known that the quality of the fibre is thereby greatly deteriorated. On the other hand, when the principal object is to produce fibre of the best quality, the plant should be pulled before the seed is fully formed. The experience of the best flax farmers in the north of Ireland and in Belgium is, that in order to obtain fibre of the finest quality, the flax should be pulled when the seed is beginning to swell. When pulled thus early, however, there is such a great waste in scutching and hackling that the yield is small, and the management of the plant requires more than ordinary skill; but when that skill is applied, the greatest profit is thus obtained. In this case the seed is entirely sacrificed. Some people, again, pursue a medium course, and pull the crop when the seeds are beginning to change from a green to a brown colour, and the stems have become yellow to about two-thirds their height from the ground. The middle course is best suited to the *present* circumstances of Irish farmers, who want the skill to produce fibre of the very finest quality.

"When yellow patches appear here and there in the crop it should be pulled.

"According to Comte de Gasparin the relative yield of seed and fibre in different countries is as follows :—

	Seeds. lbs.	Fibre. lbs.
Lombardy (winter flax)	1797	783
Do. (summer flax)	1251	860
Picardy	589	730
Anjou	675	990
Flanders	585 to 660	1111

'If,' he observes, 'we put the price of fibre at 1600d. and the seed at 260d. per 220 lb., we find the production is as 1 to 0.16. There should be 6.2 lb. of seed produced to make up for every 1 lb. of fibre reduced. In the country which, according to the above scale, gives the greatest proportion of seed they get only 2.29 lb. of seed for every pound of fibre. There is, therefore, evident disadvantage in producing seed at the expense of fibre.'

"It often happens that from want of c
paring the ground, &c., the flax plants g
ferent lengths, and are not fit to pull a
time, which causes great loss to the farm
the crop does not mature uniformly, the fil
course, be of mixed quality. And if the
unequal length, or care be not taken t
plants even, like a brush, at the roots
there is great loss to the spinner, and mo
to the spinner of the finer yarns, and, of cc
farmer. The source of loss may be expla
way : If we divide the stem of a flax plar
segments, we shall find the quality of the
middle segment is finest, the segment ne
ranks next in quality, and the fibre in the
segment is the least valuable of all. Acco
flax is in all mills which spin fine yar
three parts, and each part spun separate
others.

Now, if long and short plants be
gether, it is evident that part of the up
valuable part of the shorter one will be mi
middle or most valuable section of the lar
is better, therefore, to separate the differer
pulling the crop. When there is much sec
the plants should be caught by the puller
neath the bolls, which will leave the sho
hind. When any of the crop is lying a
from wet, it should be pulled as soon as p
kept by itself.

"The several handsful of pulled flax
crossed on the ground, to prevent the
getting entangled."

The modes of steeping the seed and of
seed are fully explained in subsequent cl
illustrations are unsparingly introduce
these tend to make the text clearly under
these we beg to refer the reader to the pan
which will amply repay its purchase.

The Garden.

THE SUBURBAN AND AMATEUR'S GARDEN.

CHAPTER VIII.

ROCKERIES : HOW TO MAKE AND FURNISH THEM.

THERE is so much pleasure to be derived from properly constructed and suitably planted rockeries, that some advice regarding them cannot be otherwise than opportune. It is scarcely possible to introduce them into any position out of character. They are alike suitable for throwing an additional interest to the villa grounds as to the large and imposing demesne. As a groundwork for a variety of plants, that will live and grow in some of the salient spots of the city squares, they really stand out unrivalled. The wonder is that they are so seldom seen. The matter of expense seems to be the great bugbear, but we beg to tell all concerned that it is more imaginary than real. The untutored mind is apt to put an extravagant estimate upon these undulating masses of rock, boulders, and petrified-like masses, so interesting to the geologist, and so suggestive to all who examine them minutely, that they are often deterred from allowing themselves to give the matter more than a passing consideration. Doubtless the furnishing of any spot to the best advantage is at all times an expensive one, but there are so many simpler and less expensive methods of going about things, that it will be advisable to present some of them for consideration and approval.

Some very nice pieces of ornamental rockwork are produced by the aid of clinkers or scoria, with the addition of a few boulders from any rivulet; and rock plants not only offer no objection to them, but spread around and over them in all directions. That kind of clinker best suited for putting on an ornamental appearance is the refuse of molten iron stones in the first process of smelting. Any one in the vicinity of furnaces of the kind can be served without stint, and there is only the lightening up of the surface requisite with a few of the larger pebble stones than can be gathered from the brook. The expense, by following out this plan, is a mere bagatelle—only the price of a man and a horse for a single day.

Then, again, where clinkers are not comeatable, in cities and suburbs where no coal or ironstone is to be found, boulders are by no means uncommon. Another very excellent thing within the province of everybody is the scoria of furnaces, or in other words, the refuse of the cupola. It is even better than the clinkers above referred to, although it is producible much after the same fashion, the metal undergoing an additional process of refinement. Once let a demand be made, and there will be plenty eager to furnish suitable articles at no great cost.

Another appropriate enough style is that made up, in a great measure, by tree roots. Cut over, as the trunks of trees are, at the collar, the root portion offers much variety of configuration. We would only advise the introduction of them, however, where the other things named above cannot easily be procured. There is one decided objection to the stumps—the tendency to decay, and the consequent facility which they offer to the breed and propagation of varieties of fungus. The appearance of some of them carries destruction and death to many of the choice plants with which they came in contact. However interesting and effective groups of them may be, their character of duration is temporary and evanescent. If selected at all, they should belong to such trees as the pine tribe, which are all so full of resinous substance that they resist decay for a marvellously long time. Moreover, unless in some very special cases, tree roots are far the most expensive of all the kind of materials suitable for alpine vegetation.

The most expensive of all the methods, and that which bears a critical examination best, is not one whit better for nursing and establishing the plants that may be introduced. True, the beauty and variety of the selected blocks are a study of themselves, independent of the plants that nestle in the little artificial recesses and niches that are specially planned for their accommodation. Artificial rockwork, and the ferns and flowers of the earth that shew a disposition to grow and increase, taken together for combined interest and beauty, have no rivals in the whole field of gardening for a commanding influence and an uninterrupted and pleasurable study. Imitation, with the simplest and least expensive materials, is clearly advisable on the part of both the city and suburban horticulturist.

Some, taking a superficial view of things, imagine that rockeries are solid, made up from the foundation with stone. Were that the case, a very simple-looking cairn would involve no inconsiderable amount of labour in the providing and arranging the necessary materials. A little investigation would effectually teach that the most gigantic artificial hillocks are mere shells. The groundwork is generally earth, and it ought to be of a friable nature, to minister to the good of the subjects that are intended to live and profit by it. All gardenesque operations are solely originated and completed according to the taste of the parties engaged. There is no absolute rule whereby a novice might be guided, for collateral bearings are so very dissimilar in character and kind, and everybody has particular and precise opinions upon what is and what is not appropriate.

The question of site may be easily disposed of, as an unqualified success can be counted upon without a studied recognition of its importance. The kind of plants that it is advisable to grow, and which we shall hereafter recommend to be grown, cannot endure with any degree of impunity the scorching rays of a meridian sun, neither will they suffer conveniently a bleak exposure. All plants are very sensitive upon that point; even the forest trees, during their growth upwards, unmistakeably point to the prevailing winds of the district, by their branches being crowded or swayed together in an opposite direction. They may, although somewhat uncomfortably, live in the dirt and smut common to all manufacturing cities and suburbs, and yield a respectable amount of foliage, and at times be gaily decked with flowers; they may survive, although in a pitiable looking state of poverty, if they have not proper pabulum for their roots to feed upon, and a supply of water in times of exigency to refresh the many stomates that are making a vain endeavour to draw from the exhausted sources in the mound beneath; but their whole system is paralyzed if exposed to the terrible desiccating influence of a summer's sun, and the bleak maiming influences of Boreas or Eurus as they sweep across the plains. Some kind of shelter must be either existing or improvised. A due south exposure is not to be thought of. Indeed, the position should veer round towards the setting sun, and if that be practicable, it is undoubtedly the best position to select. In all villas there is, or should be, ample room left to rear the cairn on the west side of the residence. It might be done also upon the east side, and even at a pinch on the north side; but that will be seldom, if ever, attempted in villa gardening. It is quite practicable, in demesnes where ground is unlimited, and where intervening screens can be reared, to shut out any incongruous object; but in the matter of villas, it is quite impracticable, looking to the kitchen and cooking departments, and all the other useful accessories, which require to be rather screened, however, from the dress-ground proper.

Having fixed upon the position of a site, it now becomes a duty to advise him to plan in the first place, and proceed afterwards to carry out and accomplish. As a rule, all round conical heaps, however relieved with an attempt to undulate the surface, ought ided. However advisable and ap- circular beds are on grass or gravel, int of simplicity and propriety they it every description of house, when n to raise them many feet above the nd cover them with stones, they are ous and unsightly masses. Moreover, sent the worst possible face for inspection, and, consequently, we eremoniously dismiss them from our tion. Straight lines are equally inding one of an improvised wall, y built "dry stone dyke." Any other more or less acceptable, and, as we noticed, the style or form fixed upon matter of taste. It must, however, lating and irregular. It may be e or two-faced, as situation admits. re closely situated, it must, of neces- ne-sided, and the best face, of course, homewards. There are considerable es in having the back piled up, even it be in a straight line, and the best ceivable, or indeed possible, is a l. If owners would agree to erect n wall between properties, a portion ld be very well used in supporting ry; and by such a method not only incongruous is shut out, but pri- l consequently additional comfort, is

The greatest triumph achievable is d simplicity combined. To attempt aborate undulation, and too many nd crannies, is exceedingly bad sides, plants break up the configura- totally defeat the finical mind. vy lines are desirable, and in- becoming diminutive, or running f being destroyed, when vegetation ing, they come out to much better . But all these undulated designs, with rock, however admirably con- d correctly carried out in point of tion, are apt to be depreciated, if yed, if indiscriminately planted. The and nooks and caves, if planted e of the grosser-growing examples of n, will, when the plants assume defi- portions, be no longer recesses or r caves. Hence the planting of rockeries present even a greater field for premeditated study than all the beds in our choicest parterres. By all means let the salient or projecting point become bolder by the aid of a luxuriant and shaggy-looking vegetation; but never mar, by planting with similar material, the reclusive points, which are always suggestive of retirement, and form the best, and proper, ground for the introduction of the choicest individual plants at command.

CHAPTER IX.

ROCKERIES: HOW TO PLANT THEM.

With the above hints presented for consideration, we are now in a position to advise with what material rockeries ought to be planted. It will serve no useful purpose to give a long list of names which the thousands interested would have difficulty in procuring; neither will it be wisdom to recommend the very choicest of plants that require not only great care, but a very fine climate to assist them to live and grow. We intend to advise the procuring of such plants as cost little money, and such as will grow in any climate, with a minimum amount of attention expended upon them. In the first place, no rockery is worthy of the name that has not less or more of ferns in it The rage for fern fronds and fern plants is unabating; it permeates all classes of society, and consequently we shall have eager readers while discoursing upon that subject. No one requires to travel out of our own islands in search of a more appropriate race of ferns than they produce, either for the decoration of a rockery, a box in a window-sill, a Wardian case, or an ornamental earthenware pot for parlour, dining-room, or drawing-room.

Take the spleenwort, for example, and it comprises a numerous family indigenous to Great Britain, all of which are important rock-plants in one or other of the select positions. One of the members of the family, bearing now the name of Athyrium Filix fœmina, is to be found is so many and so beautiful varieties, that to plant one of each would occupy a large portion of a by no means unimportant rockery. There seems to be a disposition in this particular type to vary far more than any of its congeners, and some of the reproductions from seed and sports have an elegance and beauty about their fronds that command a wide and growing list of admirers. Next in importance in the same family group, is Asplenium marinum. The fine glossy lustre, and the arching fronds of this species, render it an admirable thing, but only suited to localities within a few miles of the sea shore. But even A. Ruta muraria, or the common wall-rue, that springs out of walls and fissures of rocks, and also the commonest of the rock-growing species, A. Trichomanes, are capital plants, and bear transference to a new home with great complacency. Of the latter species there are many choice varieties. Then the black-stalked species, A. Adiantum nigrum, comes in well as a grosser-growing plant, whose roots penetrate and feed with much avidity in any good fibry peat soil.

The common brake (Pteris aquilina), which grows so abundant in woods, and, wherever stone and sand and peat predominate, is one of the best of plants for city and suburban rock-work. Once get it established, which is no very difficult matter, and it is not easily discomfited.

Then the shield ferns (Aspidium), now divided into two great subdivisions, the one the Polystichum group, and the other the Lastrea, present families comprising some of the rarest and some of the commonest of rock plants. There is P. angulare, so named from its angular-leaved fronds, found in a variety of forms, very plentifully in many parts of England. It is rare in Scotland. It is one of the very best plants for the shaded nooks of a hardy fernery, and can be readily propagated from the offshoots that grow upon the petioles of the frond. The common prickly shield fern, P. aculeatum, is by some not considered a species presenting features very much akin to the species named above. Novices could scarcely separate them, but we look upon this, independent of its botanical distinction, as much the stronger growing, and the more plentiful of the two, and quite within the province of the suburban hardy fern grower. The holly fern, P. Lonchitis, is almost solely confined to the alpine districts of Scotland. It is one of the most distinct evergreen ferns indigenous to the country, and will find lots of admirers if well treated in the hardy fernery.

Lastreas comprise the deciduous group of the shield fern. L. filix mas, or the male fern, constitutes a most important feature in any hardy fernery. The varieties of it are numerous, but they by no means approach the lady fern, or the varieties of the common hart's tongue. The normal form is very common in woods, and in all shady places where peat or decomposed leaves form a portion of the soil, and may safely be planted in any rockery. Then there is L. cristata, almost confined to England; L. dilatata and L. spinulosa, often mistaken one for the other, but essentially distinct, and both important for the work that it is our object to forward. Both ferns have a wide distribution over the islands, the broad species (dilatata) being the commoner of the two.

The Polypodiums are emphatically a group whose home is in the chinks of rocks. The P. vulgare is the commonest of the race, and has a wide distribution. The pinnatifid fronds with their linear-lanceolate segments, invest all the forms of this species with a distinctness and singularity of character that render them all the better fitted for contrasting with other species. Moreover, it is an evergreen species, and on that account doubly valuable. When we take cognizance of its hardiness, and all the other recommendations, we have said enough to interest every city and suburban amateur in procuring it. There are, besides, the common form, the alpine polypody (almost solely confined to the northern parts of Scotland), the oak fern (P. Dryopteris), and the beech fern (P. Phegopteris)—all well worthy of securing, owing to their hardiness and suitableness for common rockeries and hardy ferneries of every description.

The common hart's tongue (Scolopendrium vulgare) although an isolated species indigenous to Britain, has a family of forms not second in importance to the lady fern. It has this advantage over all others, it is really and

ing of ferns for the hardyfernery. By
eatest number of its varieties grow,
beautifully, in and over those artificial
and there are no less than four
and fifty either named, or described
Some of the small, and what might
indefinite forms, are only suited for
cases, or in-doors, where the eye is
nstantly upon them; but all that
or vigour to recommend them, may
d in the out-door fernery.

the royal fern (Osmunda regalis)
e planted in the moister position
tificial cairn. It is well suited for
localities, and might be even culti-
ccessfully in towns, as it is a purely
s fern, coming away in spring with
ur when thoroughly established.

ard fern (Blechnum boreale) is a
y out-door plant, luxuriating in al-
y locality, and consequently is a
ch every city amateur should en-
to get and grow. It is in a great
ieties, and is at all times a conspicu-
t, having sterile fronds prostrate, as
miliating position, and fertile fronds
wering above their less favoured

ed not touch, far less dwell upon here,
ish Maiden-hair fern (Adiantum
Veneris), as it requires protection,
commend the mountain parsley ferns
s crispus), which grows well upon
ly it is comparatively rare. Neither
advise the introduction of the filmy
ymenophyllum), for it is only in fa-
pots where they would succeed, and
not in city squares. The common
rt (Botrychium lunaria) might be
or its singularly throwing up tiny
early spring, and the latter ripening
g off in July, only care is needed
ng. The scaly spleenwort (Ceterach
m) is a capital rock fern, only it is a
wer, requiring some time to establish
n; once, however, it does so, it is a
object, only it is not likely to thrive under the influence of the smoke and soot of populous places. It is found plentiful in Ireland. The bladder fern (Cystopteris) has two very distinct species indigenous to Britain; the brittle fern (C. fragilis), and the mountain bladder fern (C. montana). Both are desirable plants, and would do in some localities unexceptionably well; but as a rule, they are better as Wardian case plants, than for undergoing a fluctuating season out-of-doors. The common adder's tongue (Ophioglossum vulgatum) is one of the most singular of the whole race, and only will grow in sheltered localities, and despite the struggles for existence, among a variety of grasses this little interesting subject will persevere, and make way, where, if exposed and unsheltered, it would scarcely live. It revels in moisture, and if treated according to its deserts, it will yield a suitable remuneration in its singular-branched fronds, with their fertile and sterile egments.

The collection of many of these choice ferns in itself is a delightful pastime. Some of them, undoubtedly, cannot be got without travelling over a large tract of country, but sufficient quantities and species are to be had in almost any shire to decorate a rockery. During the summer holidays there is scarce a citizen but might procure plenty and to spare for his own wants. Then additions could periodically be made of the more rare species, just as time and opportunity afforded. In such cases, where the taste for a personal raid was not strong enough, there is always the dealer in these things to fall back upon, and a collection of sorts could be obtained at a very moderate figure indeed. Hundreds, nay thousands, of well-to-do citizens, if they could be enlisted to the initiatory process of raising their cairns, of planning and completing the ground-work of the respective rockeries, can easily estimate how little, how very little, of the "wherewith" is necessary to furnish them, aye, and to furnish them in such a way as to command no little degree of sustained admiration.

QUALITIES MOST ESTIMABLE IN THE ROSE.

A ROSE, taking all things into consideration, is, perhaps, the most splendid of flowers. Throwing aside the national affection for our emblem, the rose is appreciated for itself. It has qualities peculiar to itself. It is beautiful, from the moment when the colour peeps from its green covering, until its flower is complete; handsome in all its stages. Its perfume is unequalled, and whether it be a single bud or bloom in the hand, a bush in the border, a tree on the lawn, or climbing the pillar, winding round the archway, or covering the front of a house, it is equally admired. We may have a hundred families of flowers that we can do without, but we must have the rose. Time was when we only talked of and looked for "the rose in June." In fact, we only knew of summer roses. China roses were novelties, and appreciated for their continuous blooming habits, although they were minus the highly esteemed quality of perfume.

In estimating the various qualities which give value to the rose, we are almost inclined to place that of *continual blooming* first, even before perfume, although without this a rose loses its great charm; but continuous flowering is of so much importance, the prolonging of the beauties of the garden is so essential, that we think it of more consequence than any other feature. See a garden, liberally planted with summer roses, in a blaze of beauty in June or July, and it is a second paradise; but what is it before or after that period? The rose trees bereft of adornment are eyesores;—they are, in fact, in the way until they bloom again. But see the same, or another garden, judiciously supplied with continuous blooming roses of the nature of the common China, and we have them in flower the last of all our favourites. A frost that will kill down dahlias to the ground will only injure the flowers of the rose; the buds are scarcely damaged, and it is not an uncommon thing to see continuous blooming roses flowering in a mild autumn up to Christmas; and be it remembered that we have now hund
beautiful varieties possessing this v
quality.

The next point in estimation must
aroma or scent. This needs no expla
The very petals of the rose, after all
has departed, are appreciated for the
fume.

The next quality we come to is fo
doubleness. Everybody who sees tog
double rose full to the centre, and a
double one shewing the stamens in the n
will instantly perceive the difference
richness of the bloom. Nobody will
instant dispute the propriety of re
the semi-double and retaining the pe
double. The former possesses botani
terest, but the latter is associated wi
oldest notions of perfection, and it l
times gone by, been alluded to, wh
scribing other flowers, "as double
rose."

We now come to a quality which
more importance than it at first seems
thickness of petal. The advantages
are, first, that, whatever be the colou
more dense than it can be in a thin
but apart from the superiority of
thick petals are more lasting than thi
and sun and winds have less effect
them. A rose with thick petals will
perfect for days, while thin ones are
or shrivelled in a few hours; and we
know of a more disagreeable faul
speedy decay. To see the ground s
with petals in a few hours, and the
disfigured by the remains of decayed f
is very far from pleasant, and this is
tably the case with thin-petalled roses.

With regard to colour, we have li
say; it is purely a matter of taste. Th
novel the colour of a new rose, the b
would be considered, without refere
whether that colour were bright or dul
a good rose, like a good horse, cann
be bad in colour. Scarlet is highly est

grade or shade between that and
te is appreciated, if the rose in other
is good, and so would all other
or shades. Novelty, in this respect,
ity, “ covereth a multitude of sins.”
st important point in the character of
its habit, and the best of these habits
of constantly growing and blooming
manner of the China rose ; whether
tall growing rose or a dwarf, on a
l or on its own roots, small or large,
us blooming is the first great quality,
habit should be short-jointed and
; long joints are incompatible with
ie form or abundant bloom. The
China gives one a good idea of a
it ; the shoots are scarcely 3 inches
ore they bloom, and so long as the
kept growing, fresh blooms come
garden planted with only such varie-
continue to bloom looks well at all
cept in the depth of winter, and
, except for the purposes of June
y exhibitions, the garden sorts, or
ich only bloom one month in the
ar, are comparatively useless.

orm of a rose is a point on which
y be some difference of opinion, but
round and full up in the crown roses
etter ; the form of half or two-thirds
would be very rich. We know there
y who dislike formality, but this is
ause the rose has been so long as-
with the idea of confusion. The
cabbage rose and the moss rose of
n are so exceedingly full and double,
e is no room for the petals to be
veloped. This has, therefore, been
ype of a rose for centuries, and those
ocate uniformity and formality are
very strong prejudices or predilec-
ut the same may be said of thick
cause they were at one time by no
ommon. There is no good reason
rose should not be as perfectly im-
as the dahlia or the camellia, and
ding for symmetry, uniformity, and
a perfect rose, we are only desirous
ng the fashion from confusion to pre-
The rose may be perfectly double without being confused. The ranunculus is so; the dahlia is so; camellias are fast progressing that way, and the rose itself now furnishes many examples of very splendid forms, faultless almost as regards shape. Smooth edges to the petals, without any indentation, fill up our notions as to the properties or qualities that constitute perfection. Heart-shaped petals are still common enough, but they detract from the appearance and value of a flower, whether it be a camellia or a rose, and yet if there must be indentations, these are the least objectionable; but there is no comparison between an even edged petal and an indented one.

There are remarkable roses which may seem to belong to no family, especially the weeping roses and the crested Provences, or crested mosses, the former hanging pendantly like the branches of a willow, the latter exhibiting a strange kind of crest or moss upon its leaves and blossoms. These, like the ordinary moss, are only beautiful while opening; when they have once opened, all that rendered them curious or valuable is concealed. The general qualities of the flower are the same, and apply the same, whether it be small or large, scarce or abundant, dwarf, standard, or climbing.

With respect to the qualities of the moss rose, there is but one additional remark to make : the more abundant the moss the better the variety; and although all the other remarks apply equally to moss roses, we have already said that as their beauty is veiled the instant the flower is fully bloomed, the semi-doubleness does not disqualify them altogether.

Upon the whole then, the qualities of a good rose are : continuous blooming; thick smooth-edged petals; flowers round, forming half or two-thirds of a ball, very double and full-faced, very symmetrical and imbricated; wood short-jointed; colours dense, that is, whatever its shade be, the colour decided; and if striped or blotched, the stripes or blotches well defined.

We believe we can add very little to the qualities of a rose, when it answers to these notions of perfection.

THE CULTIVATION OF CHICORY.

UNDER another head (pages 426-427) we have given a few remarks upon this crop, and have there referred to the fact, that it is one with which the continental agriculturists have had considerable experience. The following additional remarks by M. Ledocte, of Belgium, will be found useful:—

The soils that do not suit chicory well are most of the poor sandy soils, and those soils which are very dry, or, on the contrary, which fail by an excess of humidity; also those of a tenacious clay with a hard dry subsoil, which will prevent the free development of the root, and flinty soils and shallow soils, resting upon the rock or impermeable beds of clay. This plant does with rather light soils—that is to say, a soft loamy soil; but it is best in land having a certain consistence and much depth.

Like other crops, chicory pays just in proportion to the richness of the means from which it ought to draw the elements of its nourishment: but it has this valuable property of being able to be grown with profit in a soil which is impoverished by a succession of crops. That is in consequence of the property it possesses in penetrating and seeking out nourishment in inferior parts, inaccessible to the roots of the generality of crops found on our farms. Hence the result that, if the leaves are used as food for cattle, or buried as green manure, chicory, by giving a produce of high value, might be classed amongst that which are called ameliorating crops.

Manure.—Like the most of vegetables upon which the industry of the cultivator is exercised, chicory produces in proportion to the richness of the soil in which it is cultivated. In consequence of the property which we have mentioned it has, of absorbing the principal part of its nourishment from lower beds, it succeeds perfectly with late manurings. With the exception of fresh poultry manure, almost all manure does with it, provided that it is in a complete enough state of concentration, and arrived at an advanced enough state of decomposition. With to this peculiarity, this root approache est to the beet-root; like that and likes what is vulgarly called *old manur*

An upper soil formed of the compo very good for the development of the plant. If the earth is too much exh to provide for its wants, it would b to apply one or other of these f ing matters, in the absence of whic young shoot will be exposed to before having penetrated to a certain into the soil. As to its place in the rot chicory can, without any inconvenien grown in the same field three years ru By the help of a good system of cultiv could we not obtain it all in two y What passes now in many farms in rega the beet-root gives great probability t supposition; and up to the present nothing seems to oppose the notion th means of proper manuring, we might by the system adopted now with beet-ro same results with chicory.

Be that as it may, these suppositions either be confirmed or destroyed by e ence, and it remains to be seen by the r of practice if chicory can be cultivate years following each other in the same soil out any second addition of manure, and w the second crop being less than the first the case of repetition, the expense of the work is much less, which is an advanta great consequence.

Chicory can succeed indifferently to a all plants, in the same manner as ea those may succeed with chicory, which, have said, prepares the soil well for an sequent crops that may be put in it. I oats, and potatoes are those to whic generally give the preference. It has proved that the potato has a better after the chicory than before. In one cl field, beans were known to attain a ver common growth. As to the oat cro success after chicory is quite certain.

Plantations and Hedges.

MARKS UPON CONIFERÆ GROWN AT POWERSCOURT, CO. WICKLOW, IRELAND.

BY CHARLES S. FRANCE, FORESTER, POWERSCOURT.

)NG the recent introductions of exotic plants none has been of greater use to ater or landscape-gardener than those ng to the natural order coniferæ. They e beautiful symmetry with rich luxuri- nd apart from that, the many varieties ur and shade they possess is enough mmend them to all admirers of sylvan Varied as they are in species, and been already fully described and re- on, I do not think it necessary to go e merits and demerits of the different . My object in these remarks is to e the progress the Coniferæ have made, e mode of trying their capabilities, d at Powerscourt, as I think it may resting.

ostensible object in planting pinetums, om ornamental purposes, is to test the s and hardiness of the different kinds imate timber trees in Britain, or, in vords, to find out if any of them, by ality of timber and rapidity of growth, lace some of our present timber trees, urn a greater amount of profit to the . Such being the case, I believe this can never be attained by the present -viz., of selecting a piece of ground, or 6 acres, and dotting down a of plants promiscuously—for this rea- soil that suits one sort may be very ntal to another; for example, the soil l suit a Pinus insignis will not suit a um or Sequoia sempervirens, and the situations for the different sorts vary much, therefore it is not a fair test, e consequence is, that people are very liable to say that one sort is worthy of cultivation, while another is useless; and the fact may be, that the fault does not arise from the nature of the plant, but from the improper soil and situation it is planted in.

In planting, the general practice is to make large pits, put in a lot of fine mould, and have the plants from 30 to 40 feet apart. Suppose we should plant larch and Scotch fir, or any other timber tree, in this way, what would be the consequence? I am sure every tree we have would be pronounced a failure, simply because they had not the necessary protection when young, and also in consequence of their getting too great a space for the production of laterals, and thereby detracting from their timber-forming capabilities.

Powerscourt is situated on the north-eastern slopes of the Wicklow mountains, at an elevation of from 500 to 700 feet above the level of the sea, and the soil is principally a light loam, with a very porous gravelly subsoil; in some parts, however, it is of a peaty nature containing a good deal of lime, therefore, instead of selecting a piece of ground and planting it as a pinetum, we have planted coniferæ in every soil and situation throughout the plantations. In light loamy soils we plant the Picea, Pinus, Wellingtonia, Cupressus, and Thuja tribes, and in peaty and moist situations the Abies, Araucaria, Cryptomeria, and Taxodium tribes, in which situations I find them to do remarkably well.

As a further test of the capabilities of the Araucaria imbricata, I have planted, by the direction of Lord Powerscourt, a large qua tity of them in a young mixed plantation on a light sandy soil, and at distances of about 40 feet apart. This was planted about two years ago, and they are making very satisfactory progress. The object here is to allow the other species to grow up for a time as nurses, then gradually cut them away, so that the Araucaria may be the permanent crop.

I herewith subjoin a list of a few of the principal sorts grown at Powerscourt, with the date of planting, and their present height, with a few remarks on their condition, and probable usefulness.

Name.	Date of Planting.	Height in Feet.	Remarks.
Abies Albertiana	1863	9	Grows freely on light dry loam.
,, Douglasii	1855	28	Planted extensively; very fast grower.
,, Menziesii	1863	7	Very healthy.
,, Morinda	1855	12	Very graceful habit, and grows freely.
,, nigra	1846	26	Slow compact growth.
,, orientalis	1866	3	Do.
Araucaria imbricata	1855	17	Doing fair.
Cedrus Atlantica	1864	10	Free growing.
,, Deodara	1857	28	Very free growing, and hardy.
Cryptomeria Japonica	1853	36	Do. do.
,, Lobbii	1864	17	Do. do.
Cupressus Knightii	1866	6	Graceful, and free grower.
,, Lawsoniana	1863	12	Grows freely, but indifferent habit.
,, macrocarpa	1856	36	Spread of branches 29 feet; very fine specimen.
,, sempervirens	1861	12	Grows freely.
,, torulosa	1866	5	Good habit; free growth.
Juniperus excelsa	1863	6½	Fine compact habit.
,, sinensis	1864	8	Grows freely.
Libocedrus Chilensis	1863	6	Moderate growth.
Picea Cephalonica	1863	11	Good habit; grows freely.
,, cilicica	1867	4	Do. do.
,, grandis	1863	7	Very fine and healthy.
,, lasiocarpa	1864	10	Do. do.
,, magnifica	1866	4	Do. do.
,, nobilis	1864	8	Do. do.
,, Nordmanniana	1861	6	Moderate growth; extra fine habit.
,, Pindrow	1865	6	Growing strong.
,, Pinsapo	1864	8½	Growing freely; fine habit.
Pinus Austriaca	1855	19	Moderate grower; good habit.
,, Benthamiana	1864	7	Growing strong.
,, Cembra	1855	15	Compact habit.
,, excelsa	1855	30	Growing very fast.
,, insignis	1855	36	Growing freely; quite hardy.
Pinus Jeffreyii	1865	6	Healthy.
Lambertiana	1863	14	Growing fast, and healthy.
Pinus macrocarpa	1863	8	Very fine, strong grower.
monticola	1863	7	Doing fair.
Pinaster	1830	45	Good timber tree.
ponderosa	1863	6	Robust grower.
Pyrenaica	1864	8	Most useful hardy sort.
Strobus	1838	50	Good timber tree.
Sequoia sempervirens	1855	31	Grows freely in sheltered situations.
Taxodium distichum	1866	10	Grows freely.
axus baccata	Uncertain	50	Fine old tree, 10 feet of clean stem.
Thujopsis borealis	1863	12	Best of all ornamental conifers.
dolabrata	1866	3	Very graceful.
Thuja gigantea	1861	5	Good habit.
Lobbii	1864	12	Fine ornamental tree; grows fast.
ccidentalis	1855	25	Moderate growth and habit.
Wellingtonia gigantea	1858	18	Doing well; growing very fast.

ON THE BEST MEANS OF IMPROVING THE SOCIAL ANI MORAL CONDITION OF UNDER-FORESTERS AND APPRENTICES ON LARGE ESTATES.

BY PETER M'LAREN, ASSISTANT-FORESTER, CASTLE GRANT.

AS a general rule, proprietors do not feel inclined to give a large salary, even to head foresters. By large, I mean equal to a man's abilities. And as no man can be a thoroughly trained forester without a superior and solid education combined with energy of character, it follows that men possessing these qualities do not care to follow out the profession, however great may be their inclination for it, but rather enter one more remunerative. The reason chiefly urged by proprietors is, that estates do not yield a sufficient profit to enable them to employ that class of men. This is a decided mistake, and it is quite natural to think that men with but a very ordinary education and incompetent training, cannot attain to the same professional eminence as a man with a superior education and a thorough knowledge of the branches of forestry.

The comforts of an under-forester's situation depend very much on the qualification and the carriage towards him of the head forester. If the under-forester or apprentice has a real taste for his profession, a sincere desire to be thoroughly trained, and an energetic spirit ever urging him to gain more information on every subject coming under his notice, then it follows that if the head forester be highly qualified and thoroughly trained himself, he will do everything in his power to assist him. In forestry, as in other professions, there are some young men quite pleased with themselves; when they are raised to an under-forester's situation, they seem quite pleased with the amount of information they possess; in fact, cannot see the necessity for more, provided they always manage to get through their work as easily as possible. It is not expected that a man of this stamp will ever rise, either in a social or moral condition; and, besides, he cannot blame the head forester for lack of attention in him, because he has no ambition himsel to increase his comforts.

This is a subject which has been discusse from all the points in view, and the conclusio generally arrived at is, that the Arboricultur Society could do a great deal for young me in the matter. There is one way which woul be felt by many as a great incentive and spur—viz., that the Society offer prizes to unde foresters on the best written essays on all th various branches of education bearing o forestry, and that the essays be competed fo by assistant foresters only. This would nc only encourage the diligent, but spur on th slothful, by making them ashamed of the incompetent knowledge and training. I would be an incentive to every class of unde foresters, through its making them anxious t gain the prize and be taken notice of, beside bringing their abilities and intellectual powe to the test, endowing them with a wish t know more, and find out something new and, at the same time, almost unco sciously improving their social and moral co ditions.

Apprentices are quite different from unde foresters, inasmuch as they are obliged t work constantly in order that they b thoroughly trained. On the amount of pe severance and assiduity they possess, depen very much their future success. The Societ would do well to consider the propriety of offe ing some encouragement to apprentices. Th idea of writing essays would spur them on wit their education; and, in order to their beco ing highly qualified and thoroughly traine foresters, a superior education is necessary reading, writing, and arithmetic, as a matt of course, are indispensable, for no man ca fill even a very humble situation without the Many a forester is possessed of no more; b a man wishing to rise to the top of his pr ession, and that profession forestry, must have a good knowledge of drawing, so that when improvements are being carried on and estimates thereof made out, he may be able to prepare plans for the improvement. He must also have studied botany and vegetable physiology, in order that he may be able to know and manage the different kinds of trees and plants, which are the objects of his care; chemistry, that he may know the proper constituents of the various soils for the different kinds of trees and plants, as some trees grow better on one kind of soil than on another; geology, that he may know where to plant the different kinds of trees and shrubs; and entomology, that he may have an idea how to detect and treat diseases in trees occasioned by insects. Of course, it is not expected that a man should know each of these subjects thoroughly, but sufficiently to fit him for his profession; and as he advances in life he may also be advancing in wisdom. Latin is also a very useful acquirement; it is a great aid in the correct pronunciation of botanical words, as well as the correct meanings of many of our English names. If a man possess an education of this stamp, he may expect to rise in his profession, and not only in his profession but in the scale of social life.

In order that under-foresters and apprentices be possessed of such an education—and they, generally speaking, have not had, or have not used aright the privilege of obtaining a thorough education in their school days—it is necessary that they should endeavour to procure for themselves, either by self-teaching, or at an evening school, or by a combination of both, a fair competent English education as already stated, and at the same time procure by every means in their power a thorough knowledge of their profession, both practically and scientifically, and, depend upon it, ere long they will reap the benefit of their labours. I know of no book I could recommend so much to the notice of young foresters as "Cassell's Popular Educator." It contains simple instructions in book-keeping, botany, chemistry, drawing, plain English, composition and grammar, geography, geology, geometry, land-surveying, penmanship, reading and elocution, and natural history. The proprietor of an estate would confer a great benefit on those under him, if he was to encourage the village teachers to assist the young men employed on his property also in their studies. Everyone who has felt the power of education over mind and spirit must confess that without education a man is nothing. It makes men conduct themselves towards their superiors in a becoming manner, and bear themselves in the presence of and towards their inferiors in a way which is sure to command respect. Their moral condition is raised, because they have various subjects to think upon, and are never wearied trying to find out still more concerning these subjects so that their minds are invariably raised abov the mere common-place talk of uneducate men; and if they study nature with the vie to improving themselves, it is impossible b that they, being gratified, and their minds el vated as they go on improving, must of nece sity worship and reverence Nature's God. I fine, education is, in my opinion, the be means of increasing the comforts and of i proving the social and moral conditions under-foresters and apprentices employed o large estates.

*ON THE THINNING OF PLANTATIONS.**

BY WILLIAM GILCHRIST, FORESTER, CLUNY CASTLE.

ı is one of the departments of Arbori- ılture which periodically, to a greater xtent, engages the attention of all connected with wood-management. ıge to say, there is no subject con- ith the profession that has given ɔ much, and exhibited so great a of opinion, each of which being t tenaciously by its respective sup- ı the entire condemnation of all who o uphold opinions to the contrary. variety of opinions is just what is to ted, seeing that so many practical hold what may be termed localised in regard to thinning—that is, their derived, not from an understanding physiology of trees, nor from a e by personal study of their different d requirements, but from what has practised system on the estate or ɾith which they are connected, or ɾhat is recommended by some local —all of which may be perfectly ıe district or situation in which they sed, and yet be wrong if generally In fact, there is no operation that lifficult for the practical forester to :han the thinning of plantations, as y with safety be adopted in one ı, would be quite unsuitable for Therefore, it may be as well to e for all, that no definite rule for the of plantations can be given, as so pends upon local circumstances, altitude, exposure, &c.; and even ules are apt to mislead the inex- ., unless they are formed on a broad ıl basis. Therefore it would be well :ountry, and well for the cause of ure, if proprietors of woodlands ke themselves thoroughly acquainted art of thinning, so that they might ι glance whether those men who are intrusted with the management of their woods are doing right or wrong. This is the more necessary, as many an intelligent forester with good ideas on the subject, is deterred from carrying them into practice, owing to the coldness or apathy with which these operations are looked upon by proprietors and their agents. But it is cheering to observe that this indifference on the part of proprietors, in regard to thinning plantations, is beginning to give way before the enlightenment that is being diffused throughout the country by different agencies, but principally through the agency of the Scottish Arboricultural Society and its members. But enough of this preamble, and to the case in point, which we purpose to consider in the following order:—The advantage of thinning plantations; the proper time for thinning, and general method adopted; its effect on different situations, altitudes, and exposures.

I. THE ADVANTAGE OF THINNING PLANTATIONS.

It is often remarked that there is no necessity for, nor advantage to be derived from, thinning plantations, seeing that the best timber, both home and imported, is got from natural forests where no such thinning has been practised, and also that thinned plantations produce rough timber of little value, as compared with the tall clean-grown trees that are got from unthinned plantations. These arguments have been a stumbling-block to many, and at first appear to be strong opponents to those who would practise the art of thinning. But on full inquiry and examination they become more imaginative than real. Unthinned plantations may produce tall clean-grown trees, for which a large price may be got in manufacturing or mining districts; but they are mere "spars," and not one of them in a hundred ever come to be timber trees, and few of them at 70 years old are found to be in a healthy or thriving state. And again,

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ɔre the Scottish Arboricultural Society.

in plantations that have been formed by the modern planter, the trees are generally planted at from 3 to 4½ feet apart, and equally distributed over the ground. Their tops, therefore, generally rise at a uniform rate, and are about the same height during all the stages of their growth, thus presenting a striking contrast to the arrangement of the natural forest.

The natural forest, at first sight, may appear a mass of confusion, and no doubt it would be benefited by judicious thinning; still the arrangement is such as tends to encourage and promote the growth of large and valuable timber. For in all natural forests, both at home and abroad, the trees are of different sizes and ages, and are not distributed so equally over the ground as they are in those plantations that have been planted artificially; but there is generally a sufficient number about one size to form a crop. Taking the number of plants on the ground, they are often not above 2 feet apart, but they are of different sizes. The smaller ones may be overtopped by their larger neighbours, still they are not greatly injured, as their tops are not of a uniform height; they only act as nurses to the larger ones, and are the means of keeping the side branches of the latter in check. Thus it is that natural-grown timber, whether hardwood or pine, is generally so clean-grown and free of knots. Of course there are exceptions to this, as in the case of natural-grown trees that have been grown singly, or have had plenty of space for the spread of their side branches.

Now, if we consider the difference (at all stages) between natural forests, where the trees have been unequally distributed through the agency of the winds or birds carrying the seeds, and plantations that have been artificially formed, and the plants distributed at equal distances over the ground, we shall at once see, that although there is no particular necessity for thinning the natural forests, the necessity for thinning the artificially formed plantation is very great. In fact, the ultimate success or failure of these artificially formed plantations depends upon their being thinned regularly and in due time. To neglect it till such time as the thinnings are of some value simply hastening on premature decay.

Some theorists, to avoid thinning recommended the planting of young at 9 or 10 feet apart. But, except very favourable circumstances, this mendation must be considered as mere quite unsuited for general application management of plantations, the bes most practical way being to plant the trees at from 3 to 4½ feet apart, accor circumstances, and to thin out the i trees periodically as required. This more necessary, as it is no uncommon for even young trees, either from accid some other cause, to die out, thus le in the case of trees planted at 7 or 1 apart, an open space of 14 or 20 feet tainly a very wide space for young trees

Numerous examples could be given trative of the difference between thinne unthinned plantations, or rather the diff between trees that have been allowed ent space, and trees that have been co and over-drawn; but it is quite unnece as every unprejudiced forester can find proof of this on almost every estate, fro nursery to the matured plantation. Ex a line of plants (of any description) nursery, and it will be found that the that have most space are, if not the t the strongest and healthiest. Examin plantation, and compare the trees that all along had plenty of space for thei growth, or that have been grown on the tered side of a plantation—I say, co these with trees in the same plantation have at some period been over-drawn, a result will fully demonstrate the advanta thinning.

Thinning, or the providing of suf space for the development of trees, beneficial, must be practised in the nurs well as in the plantation; for there i doubt but that a great many forest tree constitutionally diseased by being crowded in the nursery lines. And a culturists would do well to take a l from the natural forests in this respect, such crowding of the young trees is found there. This over-crowding of young trees in nurseries is the result of petition and the demand for plants at a cheap rate—in fact, a cheaper rate than it is possible for any nurseryman to rear good plants profitably. And even in home nurseries, that have been formed ostensibly for the purpose of rearing good healthy plants, the plants are too much crowded, and for no other reason than that the forester has seen them growing in a like manner in the public nurseries. Better far for those who wish to grow healthy and profitable trees, to pay double the price, or even more, and get good plants, that at no period have been over-crowded or checked in their growth. For if once a tree, at whatever period or stage of its growth, has been checked by being over-crowded, it takes years to recover, and if the check has been severe, it never attains to the dimensions it ought to do. Theretore, to realise the full benefits of thinning, it must be begun in the nursery lines, and continued periodically in the plantation.

When the larch disease first made its appearance in this country, thinning and draining were the remedies practised and recommended by the most intelligent foresters, and in some instances with very great success. And at the present time, larch plantations that are regularly and periodically thinned are almost free of disease, healthy, and in a thriving state; while the contrary is the case with larch plantations, where thinning has been neglected. The spruce and silver firs are also very much benefited by regular periodical thinning, and will grow to a great size, and become very ornamental if allowed plenty of room for development; but if overdrawn and confined, they grow up mere "spars," for which but a very small price is realised. To particularise all the trees that are benefited by thinning would only be extending this paper to unnecessary length. Suffice it to say, that all artificially-formed plantations are benefited by regular periodical thinning, and if, added to this, a divisional or rotation system is introduced into the management, an increased revenue will clearly demonstrate the advantages of thinning.

II. THE PROPER TIME FOR THINNING AND GENERAL METHOD ADOPTED.

This part of the subject naturally divides itself, and must be considered according to the different plantations that generally come under the notice of the practical forester.

1st. *Hardwood Plantations.*—These are generally formed of different varieties of trees, each of which, according to its habit of growth, requires a different treatment. But in a paper like this they can only be treated collectively, or as a mixed hardwood plantation.

Hardwood trees are generally planted at from 4 to 5 feet apart, and thinning, or rather pruning (for we consider that, in the case of hardwood plantations, thinning and pruning must go hand-in-hand), should begin in four or five years afterwards, or as soon as the trees have got fairly established and have begun to grow freely. This pruning consists in simply keeping the side branches in check, so as to keep the tree within proper bounds and in equal proportions; cutting off all extra leaders, and shortening all branches that incline to take the form of leaders, leaving only one leading shoot, and preserving, as far as possible, the upright form of the tree. This system of pruning should be done at least every second year; or if done every season, it takes very little time, and is not so severe a check on the young trees as when it is not done for a longer period.

After the plants have been nine or perhaps twelve years planted, according to the situation and size of the trees, it is necessary to select the trees that will be taken out at the first thinning. This done, they should be subjected to severe pruning of the side branches, so as to give free space to the trees that are to be left. The trees to be taken out at the first thinning are of comparatively little value; they should therefore be kept growing as nurses for the others as long as practicable, only their side branches must be kept well cut back so as not to interfere with the other trees.

When the plantation has been for the fi

time thinned, by taking out the trees that have previously been severely pruned, the trees will stand at from 8 to 10 feet apart, and in a few years will again begin to encroach on each other; therefore the trees to be taken out at the second thinning must be again selected and treated in the same manner as before recommended. Young hardwood trees treated in this manner receive no check from thinning, and in a given time—say, fifteen or twenty years—will grow at least a fifth larger, both in girth and height, than trees treated in the ordinary way. When they are about thirty years old, they will have received their third or fourth thinning, and may then be standing from 16 to 20 feet apart, with good leaders and well-formed tops. At this stage they should be allowed to get a little drawn, so that they may be cleared gradually of their lower branches.

In hardwood plantations where coniferous trees are used for nurses, they must be treated in the same manner. No doubt, it is most injurious to prune or cut the side branches of coniferous trees, but at that stage of their growth they are of little use, and the cutting back of their side branches allows them to grow for a longer period, and prevents the thinning from being any check on the young hardwood trees.

In selecting the trees to be left, great care must be taken to leave the best and healthiest; and even though the permanent crop be intended to be exclusively hardwoods, a healthy coniferous tree should at all times be preferred to an unhealthy or unshapely hard-ood one. It will form no eye-sore in the lantation, but, on the contrary, if it be an evergreen, may, in course of time, be a very leasing and agreeable object, and be prized ven more than any of the hardwood trees.

nd. *Old Hardwood Plantations.*—These e to be found on almost every estate, some f which appear to have been regularly and ystematically thinned in due time, while thers appear to have been totally neglected, r at best done in a very haphazard manner. Vith these old plantations little can be done r he way of regular or periodical thinning;
but a great deal can be done by oc
taking out a tree here and there,
they seem to be encroaching on a
finer specimens, always taking car
specimens are not exposed or open
suddenly. For, when a tree at t
gets a severe check, it seldom re
wonted vigour, and although it m
green for many years, it will make
gress, and is ultimately doomed to
decay.

Sometimes in thinning these ol
tions, the best and most valuable of
are taken out, and the rough and
ones left to keep up the appearance
tation. This system should never
tised or encouraged, except when it
lutely necessary for the sake of re
wood for estate purposes. Hardw
that have been regularly thinned in t
stages, and then left to mature and g
drawn, must be very cautiously deal
they are just at the turning point
questions, profit or loss, success o
have to be decided. So much depe
the appearance of the plantation at t
that we dare not hazard a remark
probable time it will require to be
Caution must be the practice and w
of the forester, who at this stage ou
to cut a tree except it be *back-goin*
welfare of some of the intended s
require it. Some hardwood trees
grown much closer together than o
for instance, the ash and elm, which, t
turally of a wide-spreading habit, to l
profitably, must be kept a little
whereas those trees that are natura
upright habit require to be allow
space, so that they may grow to girt
as to height. All these details must
realized and understood by those
entrusted with the management of pla

Copse, or underwood, is often to
growing in these old plantations, and
of being partly encouraged, it is ofte
ted to the cruel password, "no quarte
ought not to be where the motto is, '
sticking in a tree; it will be growing
are sleeping." This copse, or und

roperly thinned out, and treated simi-
young trees, is not only ornamental, but
eful and beneficial to the health of the
trees, especially in exposed situations,
eaks and tempers the wind and storm,
events the trees from becoming stunted
rk-bound. Those who periodically
e the "no quarter" system with copse
lerwood that is growing amongst old
ought to take a lesson from the frontis-
f the Scottish Aboricultural Society's
ctions, where, in one group, is repre-
the seedling and the monarch of the
; and therein consists the true art of
g and managing these old plantations—
take out from time to time the old
atured trees, and have younger ones
up to fill their places, so that the old
ay be scarcely missed; and, above all,
ere be no great blanks, and the trees
e left not too much exposed. The
r underwood should be thinned out at
ly stage, and pruned, similar to what
en recommended for young hardwood
But no pruning ought to be done to
trees, further than keeping them clear
l wood.

Fir Plantations.—In the present back-
tate of arboriculture, when so little is
ed or known about the chemistry of
nd so many conflicting opinions exist
ng the suitability of different trees to
rious soils, situations, and exposures
to be found in Great Britain, it is no
non thing to find three or four varie-
fir trees in one plantation all mixed,
aps in rows of larch and Scotch firs al-
y. And if the plantation is even of
te extent, there will be as many, if not
arieties of soils and situations, some
ch may be suitable for growing one
tree, and quite unsuitable for another.
erein consists the necessity for the
d and experienced eye to direct the
g of the plantation, so that the varieties
unsuitable, and not thriving, may be
ut at once, and the varieties that are
o be suitable for the situation left.
ther it is best to grow coniferous trees in mixed or unmixed plantations is a question that has often been discussed amongst practical foresters, but without any definite answer to the question being arrived at. In fact, a good deal can be said in favour of both methods; but until more is known regarding the chemical ingredients of the soils, and the requirements of the different varieties of plants, the safest method—more especially as larch is now such a precarious crop—is to encourage the planting of mixed plantations. By this means the varieties of trees suitable to the different situations can be arranged, and selected at each periodical thinning, much better than it is possible to do, under present circumstances, at the time the trees are planted.

These remarks are a digression from the subject, but are only mentioned to shew the importance of having all thinning operations conducted under the superintendence of thoroughly practical men, who, although they may know little about the science of arboriculture, have, by experience and observation, acquired a practical knowledge which volumes of books or essays on the subject could neither instil nor supplant.

The first thinning of fir plantations, under favourable circumstances, sometimes takes place as early as five or six years after they are planted. This first thinning consists in cutting down all bramble, briers, whins, or other natural-growing plants that have a tendency to grow rank and choke up the young trees; also cutting over all young trees that have been damaged by the ravages of game or otherwise permanently injured or deformed; and wherever two or more healthy trees are growing closely together, one of them should be removed and planted in some of the blanks or open spaces. In fact, the first thinning of fir plantations is simply a rearrangement of the plants, and clearing of brushwood, so that the plants may be distributed over the ground as regularly as possible. It may be here mentioned that it is absolutely necessary, for the growth and future development of the trees, that all natural brushwood should be kept cut down that has a tendency to overgrow the young trees, and rob them of their nourishment, or prevent the free access of light and air to their lowest branches.

The next general thinning must be done before the trees are so close as to injure each other. Perhaps the whole of the plantation may not be ready for thinning; but no matter, for thinning at this stage will brook of no delay. Some individuals insist that at no time should the branches of one tree be allowed to touch another. But this is rather an extreme view, as fir trees at all stages may touch each other without injury. Were it otherwise, young fir trees would often require to be 30 feet apart when they are twenty years old. Pruning cannot be practised on fir plantations as an auxiliary of thinning, but pointing and disbudding takes its place; and few, unless those who have practised it, are aware how beneficial pointing and disbudding the side branches of fir trees is. It keeps the side branches weaker, and makes the tree grow tall, clean, and symmetrical, and will ultimately produce a more valuable and better quality of timber.

In thinning fir plantations, a method similar to that recommended for hardwoods may be adopted, only pointing and disbudding cannot be so severely done with firs as pruning can be done to hardwoods; therefore the periodical thinnings should be done at shorter intervals, say every third or fourth year, if the plantation is in a thriving condition, and the situation moderately sheltered. Attention should at all times be given, so that the trees may be distributed and left at as regular distances from each other as possible, consistent with the proper selection of the healthiest and most suitable trees for the permanent crop. With this end in view, the forester who would aspire to be an adept in the art of thinning must take a comprehensive view of the hole plantation, and ascertain at what disance apart the different varieties of trees, as uited to the different situations, would require be when they have been thinned for the st time. Having ascertained this, the selecion of the trees to be taken out may be made accordingly, always keeping in view what will be suitable for taking out at the next periodical thinning. By thus exe little forethought, a standard tree can relieved by taking a few branches of truder, and thereby allowing the stan the full benefit of the shelter for period. As the intruder will prot taken out the next time, it will not b ally injured, or deteriorated in value, ing a few branches cut off. This reg progressive system of thinning pl during the earlier stages of their grow the wood is of little value, entails mo diture for the time being than is o required for the management of youn tions, but the extra expense of man will be fully repaid by the extra qua quality of timber that will be produ future period. Were it considered n instances of the expense of thinnin plantations at different stages could b but as these are so dependent upon cumstances, and the demand or ma may exist in the district for thinn refrain. Suffice it to say, that the w thinned mixed fir plantations at elev old, and sold the thinnings at 4s. lineal feet, measured up to 2 inche ter at top; and again, he has thinne plantations eighteen or twenty years ol the trees would not be taken out of t tation after being cut, though offer merely nominal price. Had the tree last instance been in the same distric former, they would have been worth more money.

The trees on the outside or expos of the plantation should at all times apart, so that they may be well furnis branches almost to the ground. N though they should be considere "scrags," they will be firmly rooted, produce shelter to the interior, and b withstand the severe storms that occ sweep across the country, carrying r devastation into many a healthy and plantation that might have been sav the outside trees been able to withst fury of the blast.

Mixed fir plantations ought in gene periodically thinned until they are fro years old, at which time the most of s will have been taken out, except intended to remain as the permanent hese should be standing as near as at regular distances apart, say from o eighteen feet, or if spruce, perhaps enty-four feet, according to the differ- ations, and the requirements of the After this period little requires to be the way of regular thinning, except to any trees that may appear to be going fore they lose value, and also any tree y be injuring any of the best speci- But at this stage in the management ations, the great object should be to ne and space for the maturing of the nd the proper development of the that when the time comes for reaping of trees, the proprietor may have the on of finding the balance on the right he ledger.

ld Plantations, where Thinning has lly neglected.—These, to a greater xtent, are to be found in almost every the country, and often in situations due care had been taken, a first- p of trees would have been the result. y seem just to have been planted and to fight their own battle for existence, ig-growing varieties over-topping and the others, until the whole becomes r, and a perfect mass of confusion. s that the aid of the forester is called for; tation looks sickly and appears to be ck, and really it must require thinning. e the general ideas and remarks, and often concurred in by practical men ht to know better.

most of the trees are beginning to ns of premature decay, very little can further than taking out the dead or ; trees, for the sake of appearance and hey lose value; for to attempt to regulate the distance apart of the severe periodical thinning, after the ime has passed, is simply hastening remature decay that is already begun. ere thinning of neglected plantations, they be mixed or unmixed, hard- coniferous, deciduous or evergreen, after the proper time has passed, is considered to be one of the greatest mistakes made by foresters of the present day. It would certainly be better, if a quantity of wood is wanted, for estate purposes or for revenue, to cut out a portion of the wood at once, and leave the remainder in almost its natural state; to attempt to thin it at this stage, is simply laying it open to be blown over by the first severe gale that sweeps the country. Where a sufficient quantity of healthy trees to form a crop are to be found in these plantations, a little gradual thinning will be beneficial, only it must be very carefully done, and will require to extend over a series of years. In a plantation of this description (owing to the trees being so much drawn before thinning operations were begun), the standard trees intended for the permanent crop will require to be left much closer than trees of the same age and variety in plantations where a regular system of periodical thinning has been followed in the management.

Having selected the probable standard trees, the chief object to keep in view must be their proper development under changing circumstances, as few things are so susceptible of change as trees; therefore, only such as are materially injuring the standard trees ought to be taken out at first, and even these not all in one season. But, of course, those that are injuring must be taken out, even though they should be rather healthier than some that are left. Thus is the original shelter of the plantation kept intact as far as possible, and space provided for the proper development of the standard trees, whose growth, by the operation of gradual thinning, is rather stimulated than retarded. Numerous instances of the damaging effects of severe thinning of neglected plantations could be given; but they might be considered by some to be rather personal, and are quite unnecessary. Whoever wishes to test the accuracy of the foregoing assertions, will find ample scope and proof by examining the plantations that have suffered so much from the severe gales that have recently swept the country, totally annihilating or ruining some plantations, and scarcely turning a tree in others that were equally exposed. Whether plantations that have been regularly and systematically, and, in due time, thinned, or plantations where thinning had been neglected, and then severely done, have suffered most from recent storms, is a problem I leave for the impartial forester to solve, with full confidence as to the result.

After each periodical thinning has been finished, the drainage of the plantation should be attended to, as the open drains are often damaged and choked up with branches when thinning operations are going on.

The branches and brushwood of the trees that have been cut are generally left scattered all over the ground. These, besides being injurious to the growing trees, are a great inconvenience to the workmen at the next periodical thinning. They should, therefore, be moved at the same time as the wood. The people of the district are generally glad to get these branches for fuel, and if not, the rough of them can be taken out and burnt at very little expense. Where the preservation of game is considered important, these branches may be put up into small heaps to form artificial shelter, but they ought not to be left scattered over the ground, as they tend to encourage the growth of a number of the fungus tribe, all o which are detrimental and injurious to the growth of trees; and in these neglected plan tations it is of the greatest importance that as much pure air be admitted as possible.

III.—THE EFFECTS OF THINNING ON DIFFERENT SITUATIONS, ALTITUDES, AND EXPOSURES.

To ascertain correctly the effects of thinning on different situations, altitudes, and exposures, the circumstances under which each operation is done must necessarily be the same, or as near as possible—that is, the plantations, though of different ages, must be about the same size, and the trees encroaching upon each other in a similar manner, in the different plantations, and the first thinnings of each have been done in due time, and in a similar manner. Examples corresponding to these circumstances are scarcely to be found. But, so far as can be ascertained, thinning, if properly attended to, is generally beneficial to [illegible]tions under any circumstances. However, where it is too long neglecte
severely done, its bad effects are m
rent in exposed situations; and e
varieties of trees suffer more than o
this is owing more to the trees bein
able to the situation, than to the
thinning. For instance, if the si
sheltered, the common spruce and
are greatly benefited by thinning;
if the situation is exposed, these sa
ties of trees are materially damaged.
they will not survive thinning ma
But this is not the effects of thinning
trees are unsuitable for growing on
situations, and could not survive lon
they were thinned or not. The s
be said of the poplars, willows, al
limes. Even ash and elm, in so
tions where they are exposed, and
unsuitable, are said to be injured by
This is a great mistake, as all the v
trees that are suitable for growing ir
situations are greatly improved, m
rooted, grow to a larger size, and
greater age by being thinned in due

A few examples will corrobor
statements. In an exposed situatio
350 feet, soil light and thin, wit
bottom, a plantation composed of
Scots fir was not thinned until t
years after being planted. The
given to cut down all the Scots fir
interfering with the oaks. This
and in a few years the growth of the
at an end. This was said to be the
thinning, and no doubt it was, as
situation been sheltered, it might h
different. But the true cause was,
ning had been too long delayed,
mately too severely done for the sit

In a mixed hardwood plantati
altitude of 500 feet, situation undula
partly exposed, soil light, resting up
stone rock, the whole of the varietie
in the sheltered situations seemed i
by thinning; but in the exposed p
the planes or sycamores seemed t
proved, while the ash and elm, a
some of the oaks, seemed to be inj
at least, severely checked in their
The thinning of the plantation h

d, and the ash and elm were quite
le to the soil and exposure, so that
-going state of these trees could not be
d to the effects of thinning, although
artly owing to the neglect of thinning.
ixed fir plantation, in the same
, that had been neglected, was partly
and a portion left in the natural
he latter portion continued to grow,
ppearance, just as it had done for
while the former at once shewed
ns of stunted and checked growth, and
years afterwards the wind broke in and
d it so, and nothing remained but to
out.

plantations in the same district, that
larly and cautiously thinned, appear
n no check, but are rather stimulated.
ixed fir plantation, about twenty years
tude 450 feet, situation moderately
, soil loam, inclining to clay, it was
ed necessary that thinning operations
xtend over five years, as the wood was
ed for estate purposes. This planta-
been once thinned before, and was
r in its growth that it mattered little
t of it was taken first. But after the
as finished the second time, a striking
was visible, the portions that were
first appearing to be much healthier
nger than the last. In fact, to the ca-
rver, they appeared to be older trees.
n altitude of 250 feet, situation
, soil light loam, damp gravelly sub-
nixed plantation, containing a large
on of spruce, was all much improved
ing, but especially the spruce; they
no check, and the second year after
inned the lateral growths were about
hat they had been for a number of
evious.

ilar plantation, but in an exposed
, subsoil hard retentive clay, was
about the same time, and in a few
terwards there was not a healthy
ree in the plantation—in fact, they
to be turning worse and worse
ar; while, in the same plantation,
ch, sycamore, and elm appeared to
ly improved by the thinning.

A young hardwood plantation, in a similar situation appeared at an early age to be in an unhealthy state, partly owing to the ground being very wet. It was regularly thinned and drained, and is now, with the exception of a few ash and elm that are "stag-headed," in a thriving state.

A great many more examples could be given, the results of which all go to prove what has already been stated in this paper—viz., that thinning, if done in due time, is beneficial to plantations, and stimulates rather than retards their growth. But although thinning must be considered a very important part in wood management, it must not be considered all-important. On the contrary, the success or failure of plantations depends a great deal on the formation and the planting of such kinds of trees on the exposed parts as will withstand the storm, and shelter the interior of the plantation. The boundary line must also be laid off in a manner to resist and break the storm as far as possible.

These things are but little attended to by arboriculturists; consequently plantations do not thrive and give the satisfaction that they ought to do. It is generally after being thinned that they are discovered to be in an unhealthy state; and, without examining or inquiring into cause or effect, thinning is pronounced to be injurious to plantations, and is accordingly avoided altogether, or done when it is too late to be of any benefit. It is now a well understood and accredited fact, that cereal crops yield a heavier return when they are thin sown than they do when thick sown; and vegetables that have plenty of room grow double the size of those that are confined; and even shrubs, border plants, and bedding-out flowers, to luxuriate, must have room. And is arboriculture to lag behind, and seem to say that though every other vegetable product requires free space for its proper development, trees don't? I trust not, but hope that the day is dawning when the science and practice of arboriculture will be thoroughly understood and recognised as one of the most important of the rural arts.

ON SOME NEW KINDS OF STRAINING PILLARS FOR WIRE FENCES.

BY CHRISTOPHER YOUNG MICHIE, FORESTER, CULLEN-HOUSE.

AMONGST the various requirements of forestry, none perhaps stand higher than fencing; and of all rural enterprises, none, perhaps, is increasing more rapidly than that of wire-fencing; as many miles of it are being probably now erected annually as there were yards of it ten or fifteen years ago. This large annual increase may be accounted for in various ways, such as the extension of agricultural and arboricultural improvements, the portableness of iron fences for districts difficult of access, such as bog, moss, glen, or rocky mountain, together with the comparative cheapness of it as a fence, its general utility and durability.

Two difficulties have hitherto stood much in the way of its further adoption, the one is its comparatively temporary endurance as a fence, consequent on the decay of the wooden straining-posts which constitute its mainstay and support; the other, either the want of properly qualified persons to erect it, or of having it done at too great expense.

The first of these is here overcome in the acquisition of a cheap and efficient malleable iron straining pillar, which renders the fence so far a permanent one. The second is likewise here met in the simplicity of the pillars, which makes it cheaply and easily erected by any ordinary workman.

The writer, knowing practically the real difficulties which have uniformly stood in the way of wire-fencing, has finally surmounted these, so far as his own experience determines; but how far this has been achieved, in the opinion of others, remains yet to be known. He having of late had a large amount of work to do in the way of fencing plantations, which were originally inclosed with turf dykes, met with an array of difficulties, which he foresaw must either be overcome or the work be done imperfectly, or done at an unwarrantable expense.

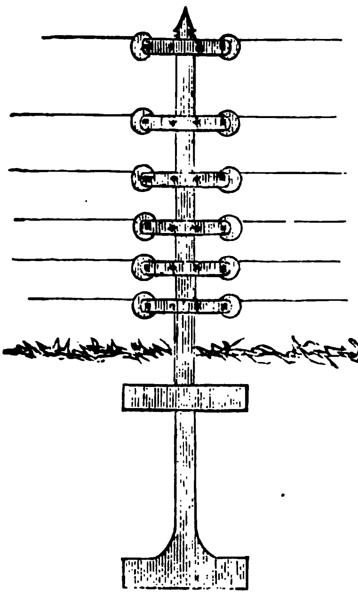
It is well known to all practical men that in no soil or situation do wooden posts decay sooner than in turf dykes; even the best quality of larch remains good only a few years. It is also known that upon the straining and tying pillars of all wire fences depend their stability and durability.

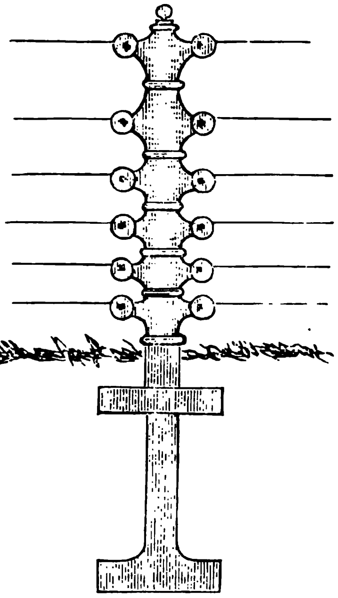
The plantation fences referred to were intended to be permanent, which implied that all the principal pillars were to be of iron.

There was nothing peculiar about the turf dykes, but they were, like most others inclosing plantations, a general succession of straights, curves, depressions, and elevations, with angles of almost every degree.

After going carefully over all the fences to ascertain precisely what was required in respect to materials, it was no difficult task so far as related to wire, staples, and wooden posts, but it was far otherwise in regard to metal pillars. It was found necessary in ordering these to state the number of wires required to be put on, and the distance between the wires. This may appear in theory no difficult task to perform, but in practice it is far otherwise. The chief obstacle lay in the circumstance that the dykes were all of different heights, and in many cases a few hundred yards required four wires, while the next stretch required only two. The whole circumstances are so well known to practical men as to need no further explanation.

It was resolved that all straining pillars should be self-acting; this is peculiarly necessary upon fences with so many curves. But, as is generally known, all the ordinary self-acting straining pillars are made with the brackets fixtures, hence can only answer for one set of fences, and wires at a specified distance; and the writer, after searching the market all over, found no such pillar as would accommodate in the way required.


No. 1.—Plain.


No. 1.—Ornamental.

He tried all the more recently invented and improved pillars, and found them all deficient in what was wanted of the brackets—viz., to move up and down so as to form any desired space between, and suit any number of wires In this dilemna, he turned his mind to the subject in good earnest, and after much labour, repeated failures, and renewed efforts, at last succeeded in making a complete set of moveable bracket pillars, equal to all the requirements of the case, or such as are likely ever to occur in ordinary wire-fencing.

Without further details, the writer will endeavour to describe briefly each pillar separately, and explain its use and place in the fence.

Every practical man knows that in any extensive fence, several descriptions of pillars are required to suit the various purposes and situations in the fence.

So far as the writer's experience goes, five essentially different descriptions of pillars are required for ordinary fencing, and these occasionally require slight alterations, but only such as can be done without in any important way altering the pillars. These five, be it observed, are exclusive of intermediate posts but include gate pillars.

No. 1 is termed the double-action accommodation bracket pillar, from the twofold office it fulfils in straining the wires. It may be placed in any straight, or nearly straight, part of the fence, between the two posts to which the wires must be attached. It strains the wires on each side to almost any distance, but 300 yards are preferable to a greater number, as the wire is less tight the longer it is between the strainer.

This pillar requires no side supports, as it is drawn equally on both sides, and is assumed to be placed in a straight part of the fence. The circumstance of requiring no stays makes it a very cheap pillar, considering the amount of straining it performs.

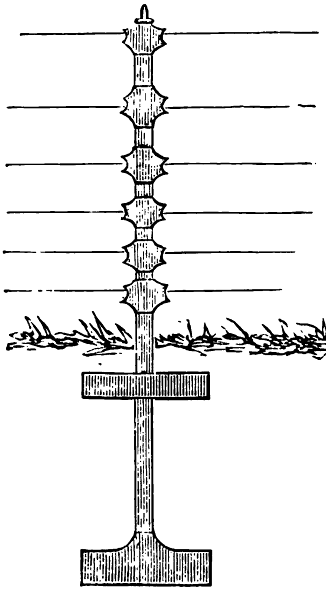
In erecting a single line of fence of any distance, from 500 to 1000 yards or upwards, only one such pillar is required, with two others different, one for each end of the fence as tyers.

No. 2 is a double-action bracket pillar, being adapted to stand at a corner where two fences meet, forming an angle nearly square.

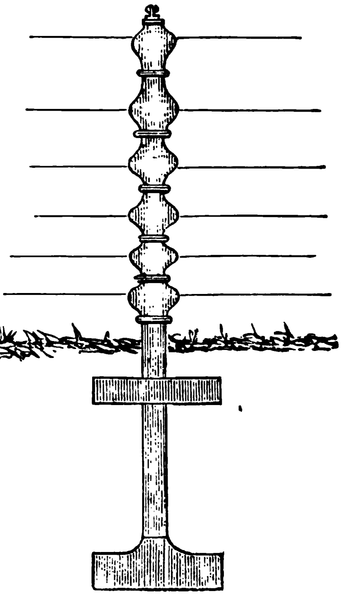
Like No. 1, it also strains two separate sets of wires, but differs from it in straining them in opposite directions. A four-sided field or plantation, where the fences run at nearly right angles with each other, requires only two pillars to strain the whole line of fence though 4000 yards in length. This is, of course, exclusive of gate posts. Each of the pillars require an inside stay, which, together with the angle brackets, make them more expensive than fig. 1; but considering that each does the usual work of two, they are very cheap.

No. 3 is the single action pillar, which is either adapted for the end of a fence, continuation of a fence, or to act as straining-pillar and gate-post combined. Two of these pillars, placed at opposite ends of a fence, distant from each other from 500 to 1000 yards, will strain the wires completely. Or if the fence is along a burn or river side, or margin of a plantation, a slight alteration of the bracket, by rivetting a staple in the close end of it, will adapt it to a fence of short straights, or zig-zag form of fence. This pillar requires a stay in most positions where it is placed, but if used in a continuation fence, no stays are required.

No. 4 is the turning pillar, which is used at angles of the fence to enable the wire to pass easily round. It consists of a round solid iron bar *above ground*, and brackets or sheaves, of a peculiar make, partly fixed and partly loose, which move upon the bar as the wire passes round them; but it is square and fixed the same as the others underneath the surface of the ground.



No. 4.—Plain.



No. 4.—Ornamental.

The stay of this pillar is not attached, as the others are, with a bolt and nut, but is made with a round hole, in form of a loop, which passes over the top of the pillar after all the brackets are put on except the upper one, and the foot of it is fastened like the others into the ground.

No. 5 is the vertical accommodation pillar, which fills a place in the practice of wire-fencing long and much required. It is adapted for carrying the fence through deep ravines, and over sharp eminences. The brackets are placed upon the pillars vertically, and secured to it with thin wedges. If the position is in the bottom of a glen or ravine, the wires are put underneath the brackets; but if, on the other hand, it is upon an eminence, the wires are placed on the top of the brackets. This pillar, being often placed in sand or moss, might be liable to be drawn up out of the ground, with the perpendicular strain put upon it; but to prevent this, it has a very broad flanged base, and, moreover, may be placed at any depth with a very little additional expense, which makes it perfectly secure against such an occurrence.

Figs. are given of Nos. 1 and 4 of the pillars.

As already stated, these five different pillars comprise all that is likely ever to be required in plain wire-fencing, and may be either so placed as to suit any emergency likely to occur, or admit of slight alterations, such as gate fastenings, &c., without entailing any new principle in the pillar.

The principal parts of the pillars are all malleable iron, and only the rollers of the brackets, and the flanges which secure them underneath the ground, are cast metal.

The pillars, brackets, and fastenings are all made separately, and are fitted together at the place where to be erected. This is a great convenience in many ways, such as in handling them, carriage, &c. When once laid down the common workmen can fit them together as expeditiously as a tradesman would do; as in doing of it there is scarcely a wrong way that can be taken.

The writer, like many others, having to do with erecting two kinds of wire-fencing, the one plain, and only for utility, the other ornamental, and to please the eye.

Finding that the pillars described were scarcely such as could be adopted in a first-class demesne, but that the principle of them was good, he further laboured to convert or transform them into ornamental pillars. The plan, like most others, when found out, was simple. The whole pillar, or at least all of it above ground, is encased in metal plates fitted on in sections. The whole is fitted on or mounted by beginning at the base, and working upward, each part secures the other last put on, till the top ball is fixed which secures the whole.

Without here mentioning others, one great advantage consists in the circumstance that, should an accident occur to the pillar, the part broken can be replaced at a trifling expense; whereas, in the ordinary metal pillars, a single stroke of a cart-wheel often renders them quite useless.

The real and main advantage of this system of pillars consists in the movability of the brackets which admit of any distance between the wires, and any number of wires being used at pleasure. The other advantages, which are by no means unimportant, or to be overlooked, will be better seen than understood by description, and as the writer contemplates exhibiting a model of the pillars described at the forthcoming annual meeting of the Scottish Arboricultural Society, the judges will be better enabled to determine their merits on that occasion.

MESSRS VEITCH'S NURSERY AT CHELSEA.

"ONE must step back in order to make the better leap," is an old saying; and assuredly on entering this establishment the first long corridor must be passed in bracing up the mind, to render it capable of making a profitable survey of the gigantic forests of tree ferns and other fine plants that enrich the glass houses of this great metropolitan nursery. Order and neatness, not only in the arrangement of the plant houses themselves, but also in regard to their occupants, are points which first arrest attention. Plants remarkable for the beauty of their leaves or peculiarities in the way of form, independently of their blossoms, are classed together. Then come ferneries, orchid houses, New Holland plant houses, specimen repositories, and ordinary greenhouses, one of which, during the last month or six weeks, has been one blaze of floral beauty, maintained by means of hyacinths and other Dutch bulbs, cyclamens, heaths, and choice general spring-flowering plants.

But novelties are what we have more especially to deal with on this occasion ; and first among pitcher plants we noticed one or two interesting hybrids. Botanists, as a rule, look upon plant mules with no great amount of favour, and it was at one time hoped by them that certain families in the vegetable kingdom would at least defy the manipulations of the hybridist. Among these were orchids, the aristocrats, as it were, of the tropical world ; but even these have been induced to yield to the skill of Mr Dominy, Messrs Veitch's general manager, who has produced some brilliant mules, more especially among Cattleyas, and now he promises to be equally successful with those singular looking productions of Nature—the pitcher plants. A new unnamed species of Nepenthes from Borneo, with spotted pitchers, has been fertilized with pollen taken from the well known N. distillatoria, and the result has been one pod of seed from which two young plants, differing considerably one from the other, have been raised. One, named N. hybrida, is a very distinct and free growing variety ; its pitchers are larger than those of the male parent, which was N. distillatoria, though they resemble that species in colour ; but the pitchers of the twin seedling, which has been named N. hybrida maculata, are beautifully mottled with bright brownish red. Both, owing to their free habits of growth, are desirable acquisitions well worth looking after. Among others were a fine Ceylon species in the way of lævis, but larger, and bearing red pitchers ; Hookerii, one of the best of all this class of plants ; the scarce N. lanata, some of the pitchers of which hold as much as a pint ; and N. sanguinea, a kind now all but lost to the country.

In a cool house was the singular looking Darlingtonia californica and the compact growing Sarracenia psittacina, the short pitchers of which are prettily mottled with rose.

Conspicuous among fine foliaged plants were Anthurium regale, with leaves 29 inches in length and 17 inches in width, the charming Maranta Veitchii, and various new Crotons, the best of which is C. maximum, a magnificent species, with leaves measuring from 10 to 12 inches in length, and 3½ inches in width, strongly barred with brilliant yellow in the way of Sanchezia nobilis variegata. Need we, therefore, say that this will make a most effective plant for purposes of exhibition. Dracæna Moorei, a red species, is also a plant which, owing to its fine habit, must command an extensive sale, as must also the South Sea Island D. regina, a magnificent white variegated kind, and Pandanus Veitchii, an ornamental plant, in all respects superior to the well-known P. Javanicus variegatus. P. gramineus, a scarce plant, has also a neat and graceful habit.

Among variegated varieties of New Zealand Flax, of which there are several here, one of the best is Phormium Collensii, a kind prettily s
white, and neat and uniform in habit.

Before leaving this department, we mu
to mention Abutilon Thompsonii (see fig
the bright green foliage of which is ric
with yellow. Out of doors, in summer, t
be extremely effective.

At the entrance to the Ferneries, two
of rock-work, enclosed within glass, are
filmy ferns ; beyond which is the hardy
soil of which is every year, about this ti
with fresh moss. This additional assist
way of verdure, just when the plants are l
push, gives a charm to the place, which i
otherwise possess. Up a rustic step or t
are in a house filled with tender ferns
beautiful description, and arranged with t
which this fine establishment is remarkabl
Lycopods, of which thousands are sold
year, stand thickly in pots by the sides o
ways, to which they form a bright refre
edging. Here we noticed a mode of u
stems of newly imported dead Tree ferns,
be worth a passing remark. They a
lengths of about 3 or 4 feet, potted,
lowed out at the top sufficiently deep to h
amount of soil. In the latter are plante
as require to be looked up to in order
full beauty, as, for example, the gold and
the under sides of whose leaves are so
But even Lomaria gibba, and the New
L. ciliata, in such positions, have a stril
as have also the little Davallia alpina, fr
and its near relation D. parvula, whose c
of parsley-like leaves render it one of the n
ing of all small-growing ferns.

Among new Adiantums, we noticed a fir
A. coccinnum, called latum (see p. 464), al
improvement on the species both in growth a
appearance, while it requires only a cool st
it in perfection. It will prove an exceedin
variety, either as a decorative plant, or fo
cut sprays for bouquets. Here we likewis
unnamed Peruvian Gymnogramma of gr
the under sides of the fronds being of the
brightest gold colour, forming a fine contr
minutely divided fennel-like leaves of G. P
which it was associated. Of the extremel
Leptopteris superba, we remarked an un
specimen, quite filling a glass case with its
fronds. Leptopteris Wilksiana, quite a n
the way of L. Fraserii, was also growing i
intermediate stove, and will be found to be
addition to miniature tree ferns. Here,
Athyrium Goringianum tricolor, a Japanes
Lady Fern, into the gracefully droopin
which have been infused red and grey co
inferior in brilliancy to those of Pteris
which it will form a good companion.

Among Orchids, in which the chief veget

of the establishment may be said to reside, are some beautiful new species, among which, however, we were only fortunate enough to find some half dozen in bloom. One was Dendrobium lasioglossum, a pretty variety introduced by Colonel Benson from Rangoon. Its sepals and petals are of a beautiful ivory white, as is also the lip, while in the centre, tinges of pink and yellow are so delicately blended as to give the flower a chaste and elegant appearance. Cypripedium lævigatum, from the Philippine Islands, was just coming into flower, four of which were on each spike, shewing that, to its other good qualities, it adds that of being a free bloomer. That curiosity among Angræcums—viz., citratum—was producing its creamy white flowers in abundance, the latter being arranged on each spike in two flat parallel rows. We also noticed Oncidium Phalænopsis in bloom, the colours of which are not unlike those of Odontoglossum Phalænopsis, but as regards size of flower, the Odontoglossum has greatly the advantage of the Oncidium. To Epidendra, E. Karwinskianum, with rich-looking spikes of yellow-lipped cinnamon-coloured flowers, will be found to be a valuable addition; and while speaking of Dendrobiums, we must not forget to mention D. crassinoda, a fine variety with handsome flowers not unlike those of D. Wardianum in colour, and with singularly knotted stems that look as if they had been subjected to the operations of a turning-lathe. The rare Phalænopsis Lobbii from Manilla may also now be seen in flower here, and the true Vanda insignis, a fine East Indian species, very different both in habit, colour, and form of flower from the

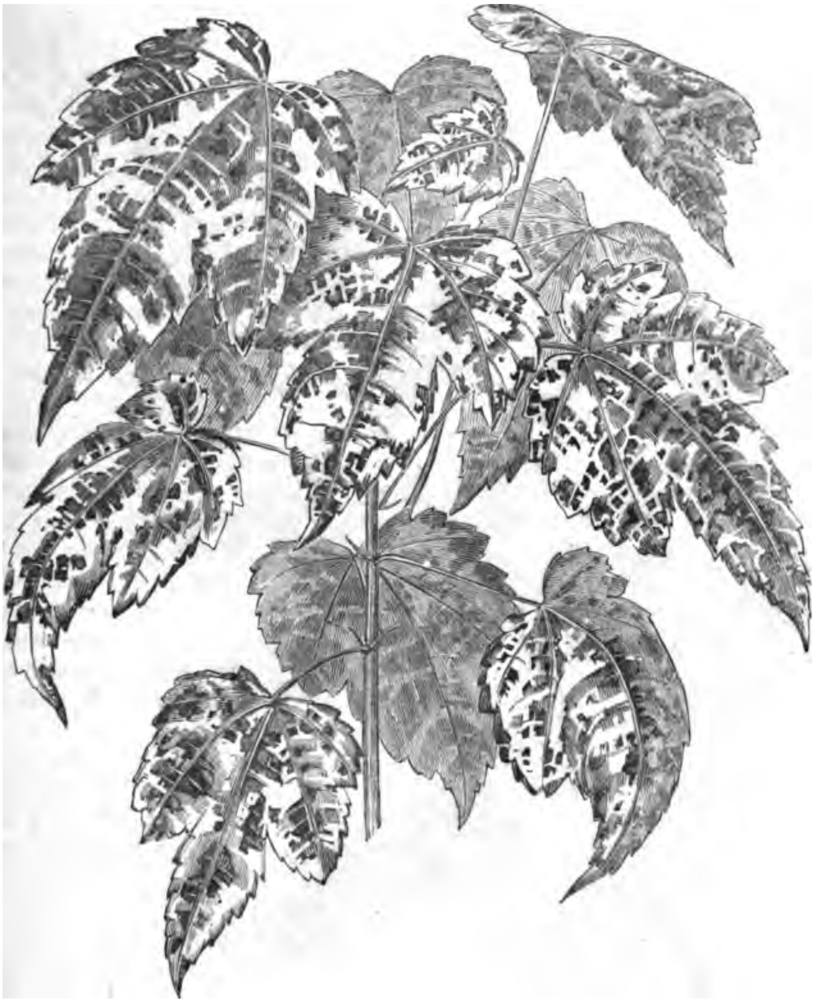


Fig. 1. Abutilon Thompsonii.—See page 462.

Java plant hitherto known in this country by that name.

We remarked here, moreover, a fine hybrid Cypripedium raised by Mr Dominy between C. villosum and C. barbatum. It has large showy blossoms, in form and appearance nearly intermediate between those of the parents, while in point of foliage it is greatly superior to barbatum. This, when generally known and well cultivated, will make a fine plant for purposes of exhibition.

Before closing these cursory remarks on this establishment, we may just mention that it has been recently furnished with a fine new glass house upwards of a hundred feet in length, which serves as an entrance to the nursery from the Fulham Road, to which it presents a handsome architectural frontage. On each side of the spacious stone pathway that runs down the middle of this house are Camellias, that have flowered finely here this season, and double blossomed Chinese peaches, whose pure white, rich crimson, and pink flowers, raised standard high, so as to be seen above the Camellias, have a brilliant effect.

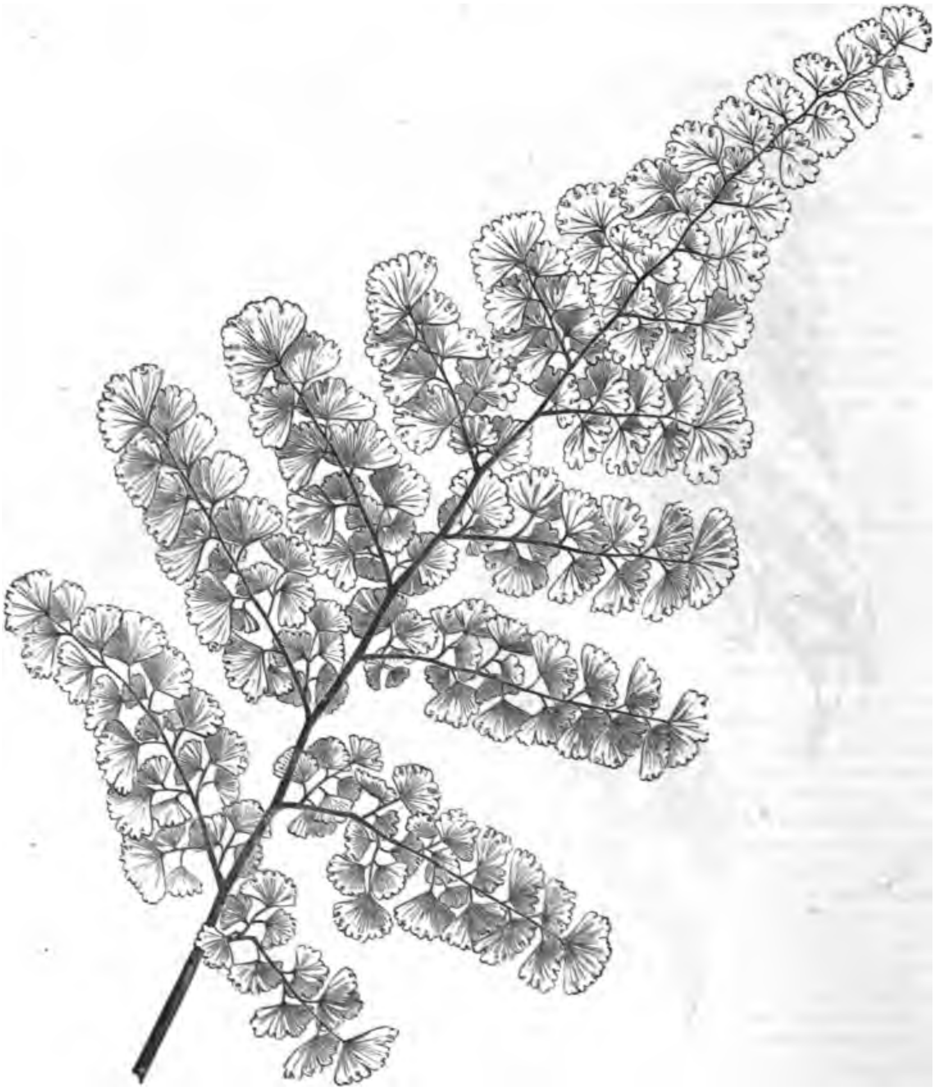


Fig. 2. Adiantum coccinnum latum.—See page 462.

Rambles by Road, River, and Rail.

BIRD'S NESTING IN CALIFORNIA.

By Mr William Murray.

IN the month of May 1851, when California was still in its infancy as a State of the American Union, I was a resident of San Francisco. One morning the captain of a British ship, then in the harbour, with whom I had some acquaintance, came to me with an excited face, and said he wished to propose a speculation.

"Well, Captain, you know we are all ready for anything that will pay; let us hear what it is."

"Yes; but first you must promise that if you do not *go in* yourself, you will not say anything about it."

Having given the required assurance, he said, "You know what a price eggs are."

I laughed, and admitted that I knew what I had to pay for a boiled egg for breakfast.

The captain nodded, and looked wise, then drew from his pocket a large green egg, beautifully spotted, streaked, and speckled with black.

"Look at that. I know where we can get a shipload of them for the picking up, and if you will provide a small vessel, I will take her to the spot, and with the assistance of my brother and one or two others, load her in a week."

"That is all very well, Captain, but when we have got the eggs to San Francisco, what can we do with them—who will buy that kind of egg?"

"Oh," laughed the Captain, rubbing his hands in great glee, "never fear but we shall sell them fast enough. I got the information from a townsman of my own, who owns a whaleboat here. He has already tried the spec himself, and sold his cargo to the restaurant folks for omelette eggs, at a dollar a dozen."

Omelette eggs were already pretty well known in San Francisco, for, owing to the great scarcity of poultry, eggs had been imported from the coast of Mexico, Peru, and Chili—aye, and even from Boston, packed in various ingenious manners, but, nevertheless, arriving in such a condition that they could hardly be called fresh eggs, yet still, when disguised with onions and "fines herbes," were available to the restaurateur for omelettes.

My friend the Captain, then informed me that the egg he shewed me was a murr's egg, and that these birds were then laying in thousands upon thousands on the "Farallones," a small group of islands rising abruptly out of the sea, some twenty-five miles west from San Francisco.

In those early days of San Francisco, we were all full of life and energy and love of adventure, and the prospect of a week's bird's nesting on this gigantic scale promised amusement as well as profit; so I first had the egg boiled to ascertain its merits, and on finding that it was as good as a fresh duck's egg, and infinitely preferable to the "omelette eggs" already mentioned, agreed to provide a small schooner for the expedition, and determined to form one of the party myself.

The Egg Company was *limited* to the Captain, his brother, another sea captain, a young friend of mine, and myself, and the crew consisted of the captain's cabin boy.

We took some provisions and a keg of fresh water on board, and sailed with the evening's tide. There was but little wind, and we did not sight the "Farallones" until the next morning.

Leaving the eggs out of the qu

the rocks were worth coming to see for themselves alone. From the midst of the waters, a mass of rock rising in the centre, like a gigantic steeple or lighthouse. On the shelving rocks, sloping towards the sea, thousands of birds, their white breasts looking like a large bed of flowers; to the right of the principal island, and only separated from it by a very narrow strait, another huge, hump-backed rock, literally covered with birds, while the air was filled with shrieking sea-gulls. We had difficulty in finding a safe landing-place, but finally discovered a little narrow sandy cove, with a whaleboat in it—the whaleboat of our captain's friend. Here, then, we anchored; and landing in the ship's boat, each provided with a basket, commenced operations. We were soon busily employed amongst the eggs, and found them in such profusion, that it was clear we should easily load the little schooner. But the interest of the trip did not end there. We had the island to explore, and make acquaintance with its population.

We found that there were three men on the island, all on the same errand as ourselves, one of whom was our captain's friend of the whaleboat. There were three or four rude huts built of rough stone, by Russian whalers, who formerly frequented the island for the sake of the seals and sea lions, which were said to have been at one time abundant there. These huts must have been long abandoned, for the floor was overgrown with grass, and of the roof there was very little left. During our stay one of our party shot a seal, the skin of which must have been of considerable value, as the fur was beautiful, but that was the only one we saw. The sea lions however, were [illegible] enough, and [illegible] flat ledges of rock [illegible] their [illegible] the sea lion [illegible] animals, but [illegible] They are in shape like a seal, but are destitute of fur. They are clothed with coarse yellow hair, not unlike pig's bristles, and their length is ten to twelve feet. One of the whaling party killed one of these sea lions, and, wishing to present the skin t
fant Museum in California, I got
sion to appropriate it, and began t
with the assistance of one or two
our party. We quickly had the u
side laid bare, but an unforeseen
prevented our completing the ta
united strength of our whole party
sufficient to turn the beast over, so
obliged to abandon the skin. We
however, two little calves, and
alive on board the schooner; pre
creatures, with fawn-like eyes.

We had been nearly a week on th
and the hold of the vessel was m
half full of eggs, when a gale of wi
and the captain fearing a storm, th
should pass the night more comfortal
of the huts, instead of sleeping on
we had always hitherto done. We
other anchor, and moored the
securely as we could. We then bro
keg of water and a day's provisions
and made ourselves as comfortabl
cumstances would allow.

The next morning the captain
early, and in about a quarter of
returned with a very dismal cou
saying,

"Well, here's a pretty go."

"What's the matter, Captain?"

"Why, she's gone!"

"Who's gone?"

"Why, the schooner to be sure,
all."

There was a dead silence for
and we looked at each other wi
dered countenances, until our positi
one of us from the ridiculous poin
and he burst into a loud laugh, w
infectious, and became general. T
not much to laugh at, however, for
really castaways on a desert islan
there was plenty to eat for the
although not much variety, but our
water was very small, and we hac
discovered any spring on the islan
was to be done was the next
The whaleboat was our only means
so the two seafaring men volunteer

to San Francisco, as soon as the storm abated and bring another vessel, whilst, in the meantime, we who remained were to gather a fresh cargo. There was no difficulty in getting the loan of the whaleboat, and our captains took their departure.

We did not find our solitude at all unpleasant, and became every day more pleased with the place and its inhabitants. I watched with interest the habits and peculiarities of the different birds.

The murr (as our captain called it) is the foolish guillemot. It lays its solitary egg on the bare rock, without any attempt at building a nest, not even a stick or a straw, but is not the less careful and attached to them, of which we saw plenty of instances. The sea gulls were flying round in great numbers, and the moment they saw an egg without the protection of the mother they pounced upon it, flew off with it to a little distance, dropped it on the rocks to break the shell, and immediately gobbled up the contents..

One day I was watching this little game, when I saw a gull hovering round a guillemot who was sitting on her egg. The gull emboldened by success thought to take the egg from under her. She drew back her neck, watched her opportunity, and with a sudden dart of her sharp bill, stabbed her enemy to the heart. I took up the dead bird, and found it had been pierced just under the wing. We cooked the gull as we were getting tired of nothing but eggs, eggs, eggs, for breakfast, dinner, and supper, and very good eating it was, entirely free from the strong fishy taste that almost invariably attaches to these birds, affording a curious exemplification of the influence food has on the taste of the animals we eat. *Mem.*—Egg-fed gulls are not fishy.

As another variety to our bill of fare, we found a bed of large mussels on the rocks, poor stuff, but acceptable as a change.

Unfortunately our keg of water gave out ere long, and we could only discover a very small spring of water, so thoroughly impregnated with guano, that even after being boiled and allowed to settle, it was very strong, although I conclude not unhealthy, as none of us suffered any bad effects from its use. Besides the guillemot, there were other birds laying on the island. First there were the gulls, but they do not lay in the profuse and promiscuous manner of the guillemot. We had to search for their nests. They were generally to be found in little cozy nooks, where the detrition of the rocks had formed miniature valleys. The nests were neatly constructed of dry grass, and usually contained three eggs, sometimes two, rarely four. These eggs were very different from the others. Smaller than a hen's egg, of nearly the same shape, of a light olive-brown colour, sprinkled profusely with streaks of a darker shade, and with a very thin shell. As an article of food we soon discovered their superiority, and during our sojourn on the island used none but them.

Next, there were the puffins, or sea parrots, as our sailors called them. They build their nests, or rather I should say they lay their egg (they lay but one) in crevices, or holes in the rocks, sometimes so far in as to be beyond reach. These puffins very much resemble those which come to breed on the small islands off the coast of Wales and Scotland (in which latter country they are called coulternebs or Tammie Norries), but are more beautiful, inasmuch as they are adorned by a long silky tuft of a golden yellow, on each side of their head. The egg is white, and nearly round. On one occasion I ventured to put my hand into a hole, when the bird was on its nest, and got a terrible bite for my pains. Their beak is very strong indeed, designed, I believe, for cracking mussel shells, and admirably adapted for the purpose.

Then there were the shags, but they built their nests on the very summit of the highest pinnacle in the island. This abode looked inaccessible from below, but I scaled it without much difficulty, and found on the top a platform, on which there were several nests of these birds. The nests were very large, and shabbily constructed of sticks and seaweeds. In one there was a brood of young ones, fledged, and nearly ready for flight, or I might perhaps better say, ready for sea. In the others there were eggs, varying in number from five to seven, white, and not much larger than a pigeon's egg: this struck me as strange, for the bird is much bigger than the guillemot, whose egg is larger than a duck's.

I only took a specimen of the eggs, as they did not seem to be worth much, but I thought one of the young birds might do for supper, so after a fight, in which he defended himself bravely, I got one by the neck, and carried him home, if I may be allowed to call our temporary refuge by that sacred name. The bird was tender enough, being young, but I am afraid his parents had reared him on fish.

There was another bird that we frequently saw on the island, but we never discovered its nest, if indeed it had any at that time. The captains called it a sea pigeon: it somewhat resembled a common pigeon in colour and shape, and in its red legs, but it was more slender and web-footed.

We found several skeletons of the pelican, but saw none of the living birds. I suspect they must be migratory, as I have often seen the live birds in the bay of San Francisco. They are smaller than the pelicans we used to see in Wombwell's Menagerie, and grey instead of yellow or white.

I think I have enumerated all the live stock we saw on the island, with the exception of the common domestic cat, of which there were dozens existing in a wild state, their ancestors having no doubt been left by some whaling vessel.

A fortnight after our first arrival our captains returned with another small vessel, in which we quickly stowed what cargo we had collected, and immediately returned to San Francisco.

We counted out a little over 1000 dozen, and sold them all to one man at a dollar a dozen.

The Stable.

ROUGH LEAVES FROM THE NOTE-BOOK OF A VETERINARY SURGEON.

CHAPTER VII.

INFLAMMATION OF THE LUNGS.

PNEUMONIA, or pure inflammation in the parenchyma of the lungs, is not of frequent occurrence, nor of so alarming a nature as when complicated as above, and is generally met with when the days are very hot and the nights cold, the animals running about a good deal during the day, and, perhaps, lying long on the cold dewy grass at night, or where the animal had been recently sent some distance to the bull, running and bellowing like mad all the way, seemed to be the exciting cause; the symptoms were heaving at the flanks, quick pulse, but round, fullish; breathing short, catching, not so much coughing; ears, horns, and legs cold; seemingly not so much acute pain, great unwillingness to move, standing with the fore-legs wide apart, and fixed, as it were; seemingly a complete chill or stagnation of the whole muscles. The evacuations in these cases were scanty and hardish, shewing the digestive organs participated, the back would be arched, and the head drooping, appetite gone, and rumination, and altogether dull; if a milch cow, no secretion, or much suppressed, with cold clammy sweat on the coat. The treatment, a copious blood-letting, with full dose of physic, or if the bowels were too confined, a full dose and a-half. In such cases, although it may seem strange, instead of dissolving the physic in water, I used ale instead, with half-an-ounce sweet spirits of nitre, and I must say never had any cause to regret the practice. Keep as often and as long as possible fomenting the udder with hot water, from not being able to be got home or to the nearest shed; shortly after the bleeding, and administering the medicine, the animal would move on very nicely. After the medicine has freely operated, a little nursing was all that seemed requisite; rarely was there occasion to repeat the bleeding or medicine twice. The disease is sudden in its attack, the animal apparently well the over-night when turned out or last seen, or shepherded, as the usual saying is, and found in the above state of a morning, and from the treatment is as quickly relieved as the attack was sudden. Let me once more here warn the farmer against those strong stimulating medicines so often used; although I seem to blow hot and cold in my treatment, still it is the result of, and I may say without egotism, sound practice in such cases; but certainly that requires great discrimination, and, perhaps, had better be avoided by those not well versed in practice.

Note.—In very hot, dry summers, in which the grass and aftermath is, I may say, completely burnt up, and towards the latter part of the year or the commencement of winter, long continued wet cold weather, with north-east winds prevailing, sets in, we soon meet with many cases, or hear that in some districts an epidemic is raging of diseases of the lungs, bronchitis, pneumonia, pleurisy, all combined in one disease, as it were. As I have before observed, in slight catarrh the upper air-passages may be but slightly attacked, and, with the exception of hoosting and coughing, the animal seems otherwise well; but if not thoroughly and at once checked, the irritation keeps increasing downwards. The substance of the lungs participate, from the continual irritation existing in the smaller bronchia, the hoosting and coughing becomes more frequent and severe. Well would it be if the agriculturist, when he hears cattle hoosting and coughing continually, have them properly examined, for I do thoroughly believe that from the gradual and insidious creeping on of the disease in the air passages and substance of the lungs, from time to time, year to year, never being properly checked, laying the foundation of pleuro-pneumonia, &c., lying dormant all the while, until some extreme sudden change of the atmosphere and weather, as above, takes place; the animals, being very much weakened from the scarcity of food, are not able to bear up against such fearful odds—chronic disease, or, I might rather say, dormant inflammation, weather, and food, or rather want of sufficient food; then we have acute epidemical disease in the shape of pleurisy, pneumonia, bronchitis, all combined, in some cases attended with acute dysentery; others when the acute stage is neglected and passed over, assuming a low typhoid form, spreading here and there over a large locality, producing consternation in the minds of the dairy farmers of the district.

Horses would have long before succumbed with acute disease under such a chronic state as we find the organs in cattle, and during life, with the exception of hoosting and coughing, giving such little indications of such a fearful state of things; the cow has only to walk from the field to the farm-yard and back twice a-day to be milked. Often have I pitied the poor animals on a cold, wet, raw, windy night, returning to the field hoosting, coughing, heads drooping, coats staring, and have often said to myself, "Ah, poor things, if you could only speak, you would say, 'Oh, keep me at home to-night, litter me well down, give me a bucket of good, thick gruel, and smash some hay; it will do me more good than sending me out in such a night as this, for I cannot graze, and must lie under the dripping tree or cold hedge, and I am [illegible] would give you more and better milk in [illegible] t is an impossibility [illegible] describe [illegible]ous symptoms of the [illegible] parts affected on paper. Long practice and acquaintance or intercourse with [illegible]s in health and disease is the only way [illegible] learn and distinguish the peculiar symptoms affecting the respiratory organs when diseased. The symptoms in one animal may be different from those in another, although both labouring under the same combination of diseases as I now speak of, but differing as to degree, acuteness, or state of the parts. No man can truly or definitely describe the disorganisation that exists in the parts within, although one may, and can, from ocular examination of the symptoms, and by auscultation, judge (from previous post-mortem examinations) what is done and what is going on pretty clearly; but there is one never-failing symptom when the pleuro is affected that any one can distinguish to be the case—and that is, to press your thumb forcibly between the ribs near to the fore-leg, when the poor animal will evince the greatest pain by sharply turning her head angrily as if to butt you, and moaning at the same time, and also lifting her leg sharply to kick you. The other general symptoms in acute, if I may term it acute, epidemic pneumonia, pleuro-pneumonia, &c., are, the animal is altogether off feeding, rumination suspended, also the secretion of milk, or almost so, peculiar grunting or moaning, peculiar twitching of the nostrils, head hangs down, a frequent suppressed kind of cough, as if the animal was afraid to cough from the excessive pain, pulse hard, quick, wiry in the early stage, later gets labouring, as it were, to get on, may be mor fuller, but still the hardness; never hardl lies down, and, when it does so, up again al most directly; seems very unwilling to mov altogether, especially the fore-quarters, and in the early stage, especially if pleuro i acutely present, and if made to move, a pe culiar shivering comes on over the chest an fore-quarters, and sometimes when still, an again especially when a fit of coughing come on; but the pressure with the thumb will d cide the point as to degree. The fæces a generally hard, and not easily voided, if the act seemed to give the animal pai at other times a softish, then again hard, other times pretty natural as regar consistence, but, like the hard, black an stinking ears and horns, very cold, anoth ıer warmish; but the legs are gene- r cold, eyes watery, with a very woe- look; nostrils discharging a thin, lengthy, streaky mucus. The t here is again bleeding, physic, ınd setons on the sides and front of ıd sedatives. The bleeding is re- ry frequently; at the same time that great practical discrimination. The he grand guide, of which the tyro in matters is but a poor judge. How- breathing may be a better guide. In stage the flanks heave quickly and deeply, with a half kind of catching laborious breathing after the first bleeding, which should be a full one, as much as the animal will stand; and although that may apparently increase the breathing for a little, soon wears off, when you will then be able to judge of the breathing after from before the bleeding. If it keeps quieter, all is going well; should it again recur as before, bleed again, but not so much as at first, and so on, keeping the bowels regular, but gently; but have a good thorough clean-out at first, whatever state the fæces may be in.

CLIPPING, SINGEING, AND TRIMMING HORSES.

uestion the wisdom shewn by the loption of a procedure, which has ong in vogue as the average number experience among horses can re- requires, without doubt, a very clear ng usage of a measure is no proof dom from fault, or that a practice is ause the majority of men think it

ıg horses was brought into vogue r the termination of the Peninsular ıce British officers brought the idea, ng seen it adopted among the ıuleteers, who partially clipped their

ators commonly spoil the works they vhen they attempt to improve on it happened when the mule-clipping was brought over and applied on s of England, on a scale and in a ltogether new.

anish and Italian muleteers clipped nly off the arms, thighs, flanks, and the bellies of their mules; leaving ntact over other parts of their bodies down to their hoofs, over the upper ence of which it forms the natural ı to the foot, and shields it from all eather, transitions from dryness to *vice versa;* while the long fetlock tuft carries every drop of water and sweat, as it trickles down the leg, behind the heel, when it falls to the ground without coming in contact with the skin at that part.

But only break the coat of hair, clip it off, and then unhealthy action follows; the skin becomes inflamed and thickened, and gaping cracks appear in the heels; meanwhile the constitution of the animal suffers.

One of the functions of the skin is that of secreting and giving off sweat; deprived of its natural state, its hair, and then exposed to a cold dry atmosphere, and the blood which should circulate in it will, in an undue measure, converge to the lungs, which, with the kidneys, will be burdened with the office of carrying off refuse matters, which function in great part is naturally effected by the act of sweating.

All clipped and singed horses are not affected alike; the state and condition of horses modify the effects. Horses full of muscle and fat, and carefully groomed, suffer least; while poor and ill-cared-for horses suffer most, and largely augment the fatality among a numerous class—the hard-worked horses.

On first venturing to attack such a settled custom as that of depriving horses of their hair in the winter, when nature provides it suitable for the season and climate, it was with no idea that men's minds could be soon changed, either by facts or reason, since, under one notion or other, almost all were passive converts to the custom of clipping.

I first witnessed the process of clipping, on some hunters in Herefordshire, in the winter of 1818 and 1819.

Down to that time horses were seen with their natural coats, technically called winter and summer coats, to distinguish the changes periodically occurring. The first-named usually became full and of normal thickness in the course of the month of November; and during that and two or three following months, horses appeared with winter coats, which good grooming made to put on a gloss such as the gloss of a clipped horse never can exhibit. Towards the end of February, and throughout March, high conditioned horses were gradually shedding their coats, while nature's suitable summer clothing was being furnished them instead.

Apart from all the evils of clipping on the constitutions of horses, it will be always found that, instead of looking as birds in spring do in their fine plumage, clipped horses appear in their rusty nondescript colours to May and June, and even in July; they, in fact, never appear in their wonted blooming colours during any season of the year, through the operation of a cause periodically repeated.

As to the saving of labour, otherwise required in rubbing horses dry and clean, it seems to be about as reasonable an excuse as the idea would be for men not to wear coats, in order to avoid the tailor's bill, or to dispense with linen, to spare the laundress' work and charge.

Hair makes up an important part of the horse: it can be spared in perspective and is cast off accordingly. If the hair was of an [illegible] was taken off there would [illegible] nt, but [illegible] the price of the hair would count for nothing if it were understood that the horse suffers by the operation. I remember some five years ago that complaints were raised about sheep being shorn in early spring, and of some being seen at the Islington Market trembling with cold. The subject was taken up by the public papers, and the market authorities warned the owners against repetition, on the ground of its being an act of cruelty—an interference justifiable on the twofold ground of cruelty, and as opposed to public economy. If graizers were to clip their cattle in autumn, it would not be easy to predict the loss that would occur in weight and by deaths, and in the consumption of extra food for the supply of material to make up the lost heat. It is not, however, on theoretical grounds that I express my views thus plainly, for my experience has enabled me to make observation on many horses, clipped and not clipped.

What are the effects, may be asked, on these many thousands of annually clipped horses? Why, many hundreds die in consequence, and many more suffer from illness of various degrees of urgency. Some escape only with such effects as those of ever after being roarers.

Having dwelt thus long on clipping, nothing remains to be said on singeing, only that of its being another and more expeditious way of denuding the horse. With all the appliances of gas, flexible tubes, and jets, the horse is singed bare in little more time than it used to take a butcher to singe a slaughtered hog.

Of trimming, we have only to notice it as an older custom, more universally adopted, and which stands in relation to clipping as the lesser evil of the two. The former produces swollen legs, cracked heels, and some constitutional disturbances, while the latter kills.

The Dairy and Poultry-Yard.

THE HENWIFE'S KALENDAR FOR MAY.

EN the chickens are a week old, it vill be found highly beneficial to to go abroad for an hour or two t of the day with the mother hen, weather be favourable; but wind t this early period would be very perhaps fatal to them. When there run, they can with safety be ad- to the garden; the little injury lo there is amply compensated by they accomplish by picking up ms, insects, &c. We cannot say or the mother hen, for she will not make her dust-bath in the very er-beds, making sad havoc among o prevent this, she can be put op, food and water outside, and ns, however far they may wander, to her.

there be a number of broods, care taken to keep the hens separate, or e sure to fight, and in their com- ot only injure each other, but even poor little chickens which flock em. Their love for their own oo, is so exclusive, that they can- o see that of a neighbour hen have nent, but are sure to ill use and e strange chicks, and prevent them en they have an opportunity. To is, each hen may have her own they have been accustomed to each n, should there be convenience for n may walk forth into the grass run wn chickens, happy when they are ound her, and secure that, when er, her call will be distinguished other, and will bring them back ing certainty to her sheltering wing. deed, a season of peculiar happi- e henwife who really and heartily o her work. Now she reaps the fruit of her labours in seeing around her numerous and thriving broods, and many a languid and listless seeker after pleasure might envy the delight with which she anticipates their wants and ministers to their necessities. Months of care and labour are indeed before her, but the labour is so sweet that she is almost sorry when it comes to a close.

When the chickens have been accustomed to a coop they will return to it spontaneously, and will not easily be induced to move from their quarters. To avoid changing them from place to place, than which nothing can be worse, it will be necessary to cover the coop at night with tarpaulin, to shelter the inmates from the wind and rain, and also to defend them from the attacks of rats and other vermin. We remember well the difficulty we had in taking the hen and her chickens, night after night, from the coop in which they spent the day to the chicken-house destined for their night quarters. We remember how they ran here and there and everywhere — how wearied and drooping and fagged they were when they reached their destination. Experience—that peerless teacher—taught us that it was better to keep them in their accustomed coop with worse accommodation, than to subject them to such fatigue and terror, in order to obtain what *seemed* to be better.

It may here be mentioned that, should any of the sitting hens fail in bringing out a respectably-sized brood, two broods may be put together. Should the hen shew any repugnance to the strange chickens, they can be put under her wing at night, and before morning she will not know the difference. The bereaved mother must be shut up by herself till she forgets her lost ones, which she will probably do in a few days.

The Naturalist.

NOTES OF A VISIT TO THE HOT SPRINGS OF JUMNO

The hot springs of Jumnotri are about 6 miles above the village of Kursalia, but as the crow flies, perhaps they are not more than 2, and the road leading to them is up the bed of the Jumna. For the first mile and a-half it is passable, at least not much worse than many of the other public highways through the Terai Rajah's dominions; but the remaining 4½ miles have to be accomplished both on hands and feet—the exceptions to this mode of progression being jumping and sliding. The views along the road, although limited, are generally grand. The cliffs on each side are sometimes rugged and irregular, sometimes perpendicular, at other times overhanging, from having their bases worn away by the action of the water. The bed of the river varies much in width. In many places it is so much contracted as to seem quite a narrow gorge, with overhanging rocks on either side. The character of the rock also varies considerably. In some places it is slaty; in others schistose, and in others a close grained quartz, brownish in colour. In some places, masses of rock, of enormous size piled above each other, occur in the bed of the stream. Some of these are considerably water-worn, whilst others have their outlines so little altered that the places from which they have been detached can be distinctly seen. The appearance of the broken faces almost indicates the dates on which they fell. One mass, in particular, a little above the village, attracted notice, perhaps from the circumstance of its being closely covered with a species of Grimmia, resembling apocarpa. This single stone measured nearly 60 feet in length, about 20 feet in thickness, and about the same in breadth. It was much weather-worn, with its corners rounded off, and irregularly furrowed. It was a schist, containing a large amount of mica. Rock of the same character only occurs *in situ* several miles further up the stream. Lots of blocks, nearly the same in size and of the same character are also found farther down in the bed [illegible] not transported [illegible] supposing that at [illegible] Hindostan, glaciers must have occurred at much lower altitudes than they do now. Another fact, perhaps, also corroborative of that supposition is, that at the mouths of all the valleys opening into that of the Jumna, enormous beds of drift occur, fine sections of which occasionally seen where cut through by the river. They are composed of earth and small st tinctly water-worn, and largeish blocks with corners and edges rounded. It is general upper angles of those beds that the villages ar and the land between them and the river te rice and other kinds of cultivation.

Behind the barriers formed by these block in the bed of the river, are piles of branche and roots of trees, splintered and broken int all of them without bark, and battered so annual layers of wood, to a considerable c be easily peeled off by the finger and thum of these fragments seemed but recently brol others, from their being battered and cho they were perfectly oval, seemed to have jected to the action of many a flood. A co number of these masses of rock lying in the river, were also variously split and shattered ner that I could not account for, as this o places where loose masses from above have been the cause, neither had they bee by the water from places where th have been thus broken, as in many position of the fragments shewed had not been disturbed since they were s hills on either side are very steep and ru tolerably well wooded. A great number o have their tops and large limbs broken off b

The hot springs are situated on the r of the Jumna, which is there only a small torrent rushing between and over the mass that obstruct its course, in many places forn little cascades. What the exact altitude of t I cannot say; it is only a little below the u of the region of trees and shrubs. On eith stupendous walls of rock, and on the side the hot springs are, it overhangs frightf rock is a close grained quartz, of a red colour, regularly stratified, and dipping N haps N. by E., at an angle of 45 degrees, or a less. The strata are transversely fracture gularly, which gives the wall somewhat the a of being built of massive blocks, all lyin edges. The springs are on a shelving rece covered with grass, brambles, &c., the lo which is perhaps 10 feet higher than the stream, but the upper end slopes abrupt water. Out of the perpendicular face of the

ss, which is the one first approached, issues
, about three-quarters of an inch in diameter,
alternately steam and hot water, with a loud
se. Another jet, similar in size, and running
issues from the wall of rock behind the
is directly over the lower one, and about 6
gher. The water coming from it is scarcely
hat of the first. On the lowest, or floor,
three wells, and a small fountain.
nost well is only milk-warm, and discharges
vater. The second is separated from the
dge of rock about a foot in width. It is
r level, and seems to boil violently. The
through the bottom of the well in a stream,
s thick as a man's arm, still the discharge
bly less than it should be from a spring of
sions. It is probable that a considerable
vhat seems to be water may be only steam,
condensed before it reaches the surface.
looks very dirty, from the great quan-
d and minute flakes of mica which it
uspension. Not having a thermometer
I cannot say what the temperature of
actually is, but judging from the
which it affected my finger, its tem-
fully 212 deg. ; in fact the hill men told
cooks rice quite as quickly as ordinary
er would. The third well is a short dis-
the second, and is on a still lower level.
not nearly so hot. A small steady stream
from a fissure in its side. Nearly opposite
le well, and between it and the edge of the
ird jet, which discharges both steam and
The water rises about 3 feet, and falls in
und. The jet is situated in the centre of a
l, flattened on the top, and regular in out-
1½ feet high, and 3 feet through, and
f a substance resembling rust. The water
feels quite as hot as that of the middle

grims annually resort to these springs, the
ich is considered as efficacious as that of
for the removal of impurities, both physi-
al. I should fancy it was far better for the
hysical impurities than the Ganges water,
application makes their black skins red.
re only shallow basins, and contain but
I did not observe any traces of either
egetable life in them ; but in the little
ch flow from them, and also under the
he jets, there occurred a great quantity of
n slimy substance, probably a coniferva.
nd of the ledge slopes abruptly into the
ere there is a small pool, in which
nother hot spring, the existence of
dicated by the steam rising from the
he water. But the frightfully overhang-
rock, directly over the pool, made me
ture in to look at it. On the side of the
te to the springs first mentioned, but a
little farther down, is another hot-spring, not milk-warm. It shews itself at the base of a great mass of *debris*. Perhaps 4 miles beneath that, and on the same side of the river, there occurs another, also shewing itself at the base of a large bank of rubbish that has dropped from the cliffs above. The temperature is considerably lower than that of the last. Another occurs still farther down, perhaps 30 miles; it also shews itself at the base of a great bed of gravel ; its temperature is similar to that of the second. The vegetation in and around these two last mentioned is peculiar and marked. Chætophora endiviæfolia, Hypnum filicinum, H. ruscifolium, and H. moluscum, Veronica species, also a conferva, all seemingly in a high state of health. What renders the vegetation in those springs more an object for notice and remark than it otherwise would, is the entire absence of life, animal and vegetable, in the Jumna and other streams that, like it, take their rise from the snow. There is not even a conferva except at that particular spot, where the water from the hot-springs falls into it, for a great number of miles below its source. I infer that animal life is equally scarce, from the fact that neither kingfishers, aizels, nor dippers, are to be met with. The plumbeous water-robin is now and again to be seen, but even it, although so common on streams a little lower down, is far from being so up there.

Growing closely around the boiling springs, first in order was a Bartramia, common everywhere, and fruiting freely, but there all the specimens were sterile. Next a Bryum, in habit not unlike B. Ludwigii, and, in company with that, B. argenteum, and a Gymnostomum. Adiantum capillus veneris also seems to agree well with the steam and heat. The lurid green gelatinous substance, above noted, grows almost under the spray from the jets, and a little farther from them, as the water becomes cooler, a conferva occurs, perhaps an undeveloped state of the one that grows so luxuriantly in the little pool at the upper end of the shelf.

Rhododendron campanulaum also comes in at the lower limits of the birch and hazel, and rises rather above them. It occurs in patches of great extent, and grows so close that it is impossible to walk through it. When it has become old and scraggy, the stems present a rather remarkable appearance ; all of them are decumbent at the base, and seem as if they had been propagated by layers from the central plant of the patch. Amongst the birches and hazels, but rather on the upper side of them, a fine rowan tree, with waxy white berries, was observed. Properly, it is not a tree, only a strong growing shrub. The fruit is produced on very regular, rather flattish, corymbs, and in shape the berries are globose, or somewhat oval ; some of those most exposed to the light are faintly streaked with red. They do not seem to be eaten by either birds or animals, still they may be so during the dead of winter, when other food is scarce. Above it grows a small Salix, in appearance like S. herbacea, was the last shrub observed on the north side of that range. A pretty little gentian was also met with on the very top of that ridge, growing in the clifts of the rocks, and I suppose a great many other things might have been found equally interesting if we had had either time or patience to have looked for them. But the morning was bitterly cold, and the ground frozen hard. Thin clothing, bad food, and ittle of it, with a cutting wind, and the immediate prospect of having our road blocked up with snow, made us almost wish that we had been in Moultan, rather on a spur of Jumnotri. Of other plants noticed in the bed of the stream and on its banks, were a beautiful little trefoil-like plant; Astragalus, two species, in flower; Epilobium, several species, one of them like alpinum; Cherleria, Sibbaldia, Cerastium, two species; one Myosotis; one Primula; Rumex, two species, one like obtusifolius; Oxalis corniculata; Polygonum vaccinifolium; Gnaphalium, several species; Gentiana, two species; Senecio vulgaris; Galega, one species; Sedum, one species; Adiantum, three or four species; Asplenium, several species; Polypodium, several species; Betula Bhajapaltra, Corylus lacera; Rubus, Leycesteria, Piptanthus, Rhododendron, four or five species, one of them a small one in habit, much resembling Azalea procumbens. On the way back some fine specimens of Lilium giganteum were seen, and a few small specimens of the Oriental Plane—the Cheenar mentioned by Moore in his "Lallah Rooke" in describing the Vale of Cashmere.

The Country House.

THE GLORIOUS VINTAGE OF CHAMPAGNE!

A FEW years ago, a certain German painter of "still life" acquired a reputation by his skill in depicting long taper glasses newly filled with sparkling wine. It was of a delicious golden straw colour, and through it rose a swift little sparkling fountain of bright beady bubbles, rushing upward like a swarm of fairies. There they were, ever gushing up to the creaming surface, yet fixed on the instant while darting aloft by the magic skill of the Rhenish painter. It was as good as having a glass of Sillery to look at that picture; two looks and a biscuit should have been enough for any reasonable person's lunch.

The wine of Epernay and Hautvilliers was drunk freely through the helmet barred, before the fifteenth century. The knights who rode beside Joan of Arc, and who played at cards with Charles the Simple, had quaffed champagne, and not without approval. In the fifteenth century, the wine of Ay met with approval. Not very long after the public approval, the kings of Europe entered the vineyards of Champagne, and appropriated and sealed up all the casks they could lay their royal hands on. They knew what was good, but they could not keep the secret.

"In 1328, Rheims wine," says Mr Cyrus Redding, who knows France well, and has written much on the French wine trade, "Rheims wine (champagne) fetched ten livres only, while Beaune fetched twenty-eight." In 1559 people had become more educated. The Reformation had opened people's eyes. Champagne was then dearer than average Burgundy. In 1561, public enlightenment went on. Champagne rose as the world advanced. In 1571, champagne was eight times its original value; so we must presume that all this time the cultiv tion of the Champagne wine was improvin and the art of pressing the grape improvin too.

Champagne was much appreciated by M Froude's fat friend, Henry the Eighth; h and Francis the First equally admired i Leo the Tenth drank papally of it; nor di long-headed Charles the Fifth (rather a gou mand even in his last moments, as Mr Sti ling has shewn) neglect the most deliciou secret of Bacchus. Wise potentates! The had, each of them, a commissioner at Ay four men who spent their lives in watchin the grapes.

In the year 1397, Wenceslaus, King Bohemia, came to France under pretence negotiating a treaty with Charles the Sixt He reached the fatal city of Rheims, famo for its cathedral—and its champagne. Th great Bohemian drank, and got drunk. H drank again, and got drunk again. To quot the old negro's excuse, "the same old drink held him day after day. He never got sob any more; he remained soaked in champagn forgot all about Bohemia, all about the treat all about Charles the Sixth and the dispute claims, all about everything, but drank unt he saw a bill that sobered him, and terrifie him into departure.

In the year 1610, champagne met wi great approval (especially as the wine wa given away—some people, like Sheridan, ca take any *given* quantity) at the coronation Louis the Thirteenth. Thenceforth it b came the king, or the queen, of French wine Champagne was crowned with Louis th Thirteenth, and of the two, champagne mad the better monarch.

In the history of all success there is

period when malice, jealousy, and rivalry stand at bay, and bear down upon their enemy for a last determined struggle. Champagne had to bear this final charge of the imperial guard of envy, hatred, and all uncharitableness. The French doctors of medicine began, in 1652, a discussion on the sanatory and injurious effects of champagne, which never ended until 1778. Doctors were born, grew up, and died, and so did their patients; and still, while the world let the corks fly gaily, reckless of all consequences, the inexhaustible doctors went on shaking their periwigged heads, doubtful, very doubtful, whether champagne did or did not produce gout. At last a verdict was pronounced. Æsculapius adopted the wine, and branded it as safe thenceforth for ever. It has been brandied since by non-Æsculapians, but it has not become the safer for that. Then broke out its eulogists into a flood of praise. Venner declared that it excelled all wines, and ought to be reserved for himself and the peers and princes of France. Beaudius even declared it "vinum Dei."

We all know a glass of good dry champagne. It is indeed what Dr Druitt sensibly calls "a true stimulant to mind and body, rapid, volatile, transitory, and harmless." It should be firm and clear, says the doctor, with high grapy bouquet and flavour, which survives the charming tide of effervescence. It should be lighter and sweeter than dry Sillery, and should have a slight pineapple aroma. It should slightly cream on the surface, not froth; and should send up bright, clear, sparkling bubbles of carbonic acid gas. The inimitable aroma should leave an agreeable memory on the palate. In fact, it should be as unlike what you generally get as possible.

The champagne vine grows in the departments of the Ardennes, the Marne, the Aube, and the Haute Marne. The best wines come from the Marne—"the vineyards of the river," as they are called. The district of the vine-growers divide into four divisions —the river, the mountain of Rheims, the [illegible] Thierry, and the valleys of Nor- [illegible] Tardenois.

The first-class of champagne stands
Sillery, pale amber, with dry taste, ri
and fine bouquet. The best is the
Roi, grown in the vineyards of V
and Mailly, which stud the nortl
slopes of a chain of hills that sepa
Marne from the Vesle. These v
formerly belonged to the Marc
Sillery, who has thus delightfully imm
his name. The wine was long know
wine de la Marechale, from the M
d'Estrées, who watched over its careft
facture; but the marquis has long si
gallantly expelled the memory of la Ma
Sillery is allowed to be the most sp
and choice, besides being the stronge
durable, and most wholesome of th
pagne wines. It is unquestiona
highest manifestation of the div
Bacchus in all France. Ay scatters
down a calcareous declivity, open
south, and casting green shadows
clustering leaves on the waters of the
The district extends from Bisseuil
border of the department of Aisn
still and creaming Ay wines, when ma
and in a good year, are supreme. T
as usual with this class of wines, is t
They are consumed in Paris and l
but not in America. Mareuil com
and Pierry, which produces a drier w
keeps better than Ay. A slightly fli
marks Pierry. Then follow Dizy an
nay, which are sometimes equal, so
inferior to, Ay. The "Closet" w
Epernay hold their own with those of

The second-class champagnes c
those of Hautvilliers (nine miles from F
these champagnes formerly ranked h
have now degenerated, or are less c
made. Then come the wines of C
Avize, Oger, and Ménil, all near F
and all made of white grapes, which a
used to give stability to the wines of

In the third-class come lesser sorts, C
Monthelon, Grauve, Mancy, and oth
yards near Rheims. The first two
are bearable, the rest have no body
mixed.

The effervescing wines are seldom
None of the white wines can be mixed

e growth of neighbouring districts, but
e red they do anything. The best of
l is the Clos, or St Thierry, which has
ndy and champagne quality blended.
untain wines (little known in England),
Verzenay, and Mailly, are of good
. Bouzy has a particularly delicate
, and Mont-Sougeon will keep well
y years.
grey wine is obtained by treading the
for a quarter of an hour before they
press. For the pink they tread still
but the rose-coloured Rheims wines
inferior) are made by a tinge of very
red wine, or by cream of tartar,
of elderberries manufactured at Fromes.
best red wines are fit to use the
year, but they will keep well for six or
The ordinary champagnes are in per-
the third year of bottling. The best
gain in delicacy for from ten to twenty
and are often found good even at thirty
rty.
d champagne did not drop from the
nor flow from the rocks. It
produced by hard labour, patient
and deep observation. In the
lace, the champagne soil is special,
nnot be imitated. The favoured vine
on calcareous declivities where the
is mixed with flints. Every process of
acture is conducted with a thoughtful
f which Burgundy ought to be ashamed.
grapes are used for the best white
ing and foaming champagnes. The fruit
ked at sunrise, while the dew is still
ing on the bunches and pearling on the
n and yellowing leaves. The foggier
tage weather, the better the fermenta-
oes. Black grapes are found to resist
st and rains of vintage time better than
ite. They are picked with minute care
atience, almost one by one; every
or unripe berry, every berry frost-
, bird-pecked, wasp-eaten, or bruised, is
en under foot, as worse than useless.
thering the fruit, in emptying the
ts, in carting them to the press, all
motion is avoided, and they are placed
e cool shade. They are then spread
carefully on the press and crushed rapidly, but only for an hour. Each pressing has its own name, and forms a specific quality. The precious juice is removed from the vats early on the following day, and poured into sulphured puncheons. Soon after Christmas, the fermentation being over, on the first dry frosty day, the wine is racked; a month after the wine is racked again and fined with isinglass; and before it is bottled it is again racked and fined. By the month of March, it is all in bottles, and six weeks afterwards it becomes brisk. The sediment that collects in the neck of the horizontal bottles has then to be removed by taking out the corks and adding fresh wine. This entails a great loss; in fact, an irritable champagne wine merchant would soon lose his senses, his loss is so perpetual. In July and August, the 500,000 or 600,000 bottles, that M. Moet stores in his limestone caverns at Epernay, fly and shatter by dozens, and the workmen have to go down with wire masks on, to try and stop the popular effervescence. The great brittle piles, 6 feet high, will sometimes burst and explode, whole hills of them, in a week, sending the champagne in floods over the floors, or cascading their sounder brethren. Then, the closing the bottles by clinking them together and rejecting every one that has too long or too short a neck, or that has even a suspicious air bubble in its thin green walls, is also expensive. Costly, too, and dangerous is the mode of corking, by sharply striking the cork; the bottle at the time being placed on a stool covered with sheet-lead.

From beginning to end, the manufacture of this wine is precarious and complicated, nor can we wonder that many respectable merchants at Rheims never sell it under three francs a bottle, however plentiful the vintage. It may well reach a high price before it comes on our tables.

An average Champagne vintage produces, Mr Redding informs us, 40,968,033 gal. from 138,8,70 acres of vines. The merchants of Paris and Meaux take nearly all the growth of the Epernay arondis nent. In 1836 France consumed 626,000 b

The export was then reported at—England and East Indies, 467,000 bottles; Germany, 479,000; America, 400,000; Russia, 280,000; and Sweden and Denmark, 30,000.

We have already shewn that pink champagne is a mistake, a mere poetical fancy. We must now repeat an old warning—the briskest and frothiest champagne is never the best. The brisk wines are always defective in vinous quality; the small portion of alcohol they have passes off in the froth, and the aroma with it. Humboldt proved this by collecting champagne froth under a bell-glass, surrounded with ice. The alcohol instantly became condensed on the sides of the vessel.

The reason why champagne sometimes plays old gooseberry with us, is because it contains so much of young gooseberry. Bad champagne tastes of brown sugar-candy and brandy. For the French and Americans, the foreign wine doctors add one-fifth of wine and syrup; for the fiery Englishman, who will swallow anything, one-tenth of brandy and syrup.

They also (the treacherous villians) use capillaire, Madeira, Kirsch, and strawberry syrup. Nay, the Americans have actually made champagne from petroleum. As there is but one positively good vintage to six ordinary or bad vintages, it is necessary, the rascals of Rheims believe, to sugar-candy and brandy the acrid and weak wine that the sun has frowned upon, and in the language of the trade "bring it up to the mark. And here we have one answer to the question, What is a mock sun?

THE

COUNTRY GENTLEMAN'S MAGAZINE

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DEER FORESTS.

THE red deer, which has from time immemorial been considered one of the noblest beasts of the forest, is spread over many parts of Europe and Asia, and was at one time generally found all over Britain. Up to a comparatively recent period, in Germany, France, and England, a pack of stag-hounds formed part of the establishment of every sovereign prince and wealthy noble, and the hunting of the deer was made almost a science, and pursued in a stately and magnificent manner according to recognised rules, which are treated of at length in many of the works of the seventeenth and eighteenth centuries. These antient works are full of praises of the stag, which describe him as "the stateliest beast in his gate that doth go upon the earth, for he doth carry a majesty in his countenance and gate." The details also of hunting, killing, cooking, and serving this animal had each its appropriate phrase; and if a gentleman should have omitted one of these ceremonious appellations he would have been held in very low esteem by his compeers.

The male red deer is called, before being one year old, a *calf;* after one year old, a *brocket;* at three, a *spire;* at four, a *staggart;* at five, a *stag;* and at six, a *warrantable stag.* The female is at first a *calf;* after one year old, a *hart;* and at three years old, a *young hind.*

The colour of both stags and hinds upon the neck, back, sides, and flanks is of a reddish brown. The face is, however, shaded off with a gray or ashen hue; about the jaws a dark brown stripe of wiry hair extends from the top of the neck between the ears to the shoulders, and is sometimes called the mane of the deer. The stag is furnished with a coat of thick hair round the throat, which at the end of autumn increases in growth, and forms a thick ruff during the winter. The horns, however, of the stag form his distinguishing characteristic, and give to the head an expression of great majesty. By them, also, his age can be easily determined. When a stag is two years old, he has a knob of horns about 2 inches in height thrown out on each side of the head. At three, a spire or upright horn about 6 or 8 inches high, with a *brow* antler projecting from the base of the horn. At four, a spire of about 14 inches long, with one brow antler and another projection called the *tray.* At five, the *bay* antlers are added, with two points or *crockets* at the top of one horn. At six, the "warrantable stag" has brow, bay, and tray antlers, with crockets at the top of each horn. At seven, a stag has all his "rights," with three points on the top of one horn, and two on the other; and at eight years old he has three points on the top of each horn. About the end of April the horns fall off, and it has been stated that they are bitten to pieces by the stags, and such portions of them as cannot be destroyed are concealed by them. At all events, a comparatively small number of cast antlers are found by the keepers. In about three months the new antlers are fully developed, at first as white as ivory, but soon turn to their usual dark brown colour.

The weight of a stag's antlers varies from 10 to 15 lb., and in Germany they are found as heavy as 30 lb. The new antlers are always an exact counterpart of the old, with the addition of one or more sprays.

In parks where deer are kept it is of importance occasionally to dress them, at the time when the stags are renewing their horns, with chalk, lime, or crushed bones, as for this process of nature a large quantity of phosphate is required.

In England, wild deer are now only to be found on the high moorland sweeps of Exmoor and the open wastes stretching away to the Quantocks, a district flanking the Bristol Channel, and extending from north to south about 40 miles, and east to west about 50 miles. In this district the hunting of the wild deer is still kept up, and an interesting account of no less than forty-six years' experience of this sport was a few years ago given to the public by Mr Charles P. Collyns. Stag-hunting was never probably practised in the same way in Scotland, as the nature of the country offers too many obstacles to this mode of pursuit on horseback. The deer forests of Scotland, however, are of great extent, and contain many thousands of deer. A notice of them will subsequently be given.

The period for stag-hunting in England commences on the 1st of August and ends on the 8th [illegible] 8th, hind-hunting [illegible] may be continued, [illegible] Christmas. No- [illegible] displayed by [illegible] at certain [illegible] usually found with one or [illegible] deer in their company. [illegible] these young ones they exercise absolute [illegible] and dominion. The young also regard [illegible] their rulers, and in every action and movement the old stags seem to asse superiority over their younger brethren. hunted, it is a common incident, sa Collyns, for one of these old stags to t covert until he can light on one of his y companions. When found, the vetera stamp of the foot or application of th rouses his young friend from his bed in which he places himself, and putti head close to the ground, allows the l to pass him in pursuit of the dislodge stitute. Probably the sense of smell stag most acute—enables the cunnir forester to find out the whereabouts inferior, but certain it is that the trick i played, though seldom with success, habit of the deer being known to the men the change is frequently discovere the wily old rogue prevented from r the fruits of his craftiness and subtlety Collyns has known an old stag, durir chase, turn out three different deer, a down in their beds or lairs. On each sion the hounds were stopped, brough and laid on again. At length, being u after beating the covert, to find anoth to do duty for him, he broke, and, good run, foiled his pursuers by sinkin self in a deep pool and allowing the l to pass him.

This is not the only service wl master hart of this kind compel young deer to perform. As the rutti son comes on he permits, and app induces, his lighter limbed companions upon themselves the task of bringing his reach the hinds which are to ha honour of forming his harem. Wait the side of some favourite stream or pool, to which he knows the hinds, v and heated by the incessant but f attentions of the young gallants, will the old veteran lies in wait till his believe they are about to enjoy the fi their labours, and then rushing out soo the involuntary panders to flight, and p devotions to the dames whose favour so ardently sought for. An old sta sometimes baffle his enemies by sinkin self in a pool or river, keeping only hi r but a small part of his head, above ter. In this way the scent is lost, and l often lie there concealed for hours e danger is past.

season of 1867 was one of great suc- a the moors of the Quantocks, no less velve "warrantable" stags having been l, and every one of them taken.

ough the chase of the wild deer is con- to this district, there are in England magnificent deer parks, some of which, s that of Lord Abergavenny at Eridge, sex, unquestionably date from the years of the Norman period. The r of these parks at present tenanted by 334, in 31 of which red deer are kept. Royal Park at Windsor contains 2600 Lord Egerton of Tatton's Park, at , in Cheshire, contains 2500 acres. im Park, in Oxfordshire, contains acres, of which, however, only 1150 en to deer. Among other nearly as ive parks may be mentioned Richmond Surrey; Eastwell in Kent; Grims- in Lincolnshire; Thoresby in Notting- ire; and Knowsley in Lancashire.

se parks are stocked with the general es of fallow-deer, viz., the dark kind, sed by some to be indigenous, and by to have come from Denmark; the coloured, spotted kind, otherwise Menil or Manilla deer, from their being sed by some to have been brought from la, in the Philippine Islands, about the 730; the white and cream coloured, ellow or fallow, the skew or blue, e bald-faced kinds, to which a smaller known as the dun, divided into olden dun and sooty dun, may be . The young of the fallow deer the ar, whether male or female, is called a -from the French *fan*, *faon*, which, it een said, is derived from the Latin , and has no horns; the second year le is called a *pricket;* the third year he d a *sorel*, which, in the fourth year, is d to that of *sore*. In the fifth year he at the honour of being called a *buck* *first head*, when his horns take the ted form. In the sixth year he is accounted fit to be killed, and is called an *old* or *great buck*.

In parks the number of deer kept should not be too large. About one deer to the acre is a good proportion, and even fewer if sheep are supposed to be with them. Cattle and horses consume a coarser and different quality of grass than that eaten by deer; and in some parks, after their introduction, the deer are said to have improved.

It has been noticed that in parks deer have regular habits of feeding, and Earl Nelson has stated that in his park of 21 acres the deer go over it twice in the twenty-four hours, and with such regularity that the time of day can be told by their position in the park. About 11 o'clock A.M. they leave off their feeding, and lie down in the middle of the park; about 5 they resume it, and work up regularly, coming to the front of the house.

In Scotland, besides the deer parks attached to the residences of some of the nobility, the forests in several of the northern counties are of great extent, and contain many thousands of deer. The extent of country thus appropriated is estimated at no less than 2,000,000 acres, or 3,125 square miles.

In Sutherlandshire there are the forests of Dirrie-Chat, an extensive tract parallel to the eastern coast of the county, about 50 miles long by about 20 miles wide; and Dirrie-More, a district extending from Ben Leod to the head of Glen Dhu, about 30 miles long by about 20 miles in width, and comprehending the minor forests of Ben Hope, Fionaven, and Arkle or Stack. Besides these two large forests, there are the minor forests of The Parph, Klibreck, and Dirrie-Meanach. It is supposed that about 1500 red deer are at large in Sutherland.

In Ross-shire there are many estates on which red deer are abundant, such as those of Lord Lovat, Mackenzie of Coul, Mackenzie of Gairloch, Ross of Balnagown, Munro of Fowlis, Davidson of Tulloch, &c. Applecross is a celebrated forest, and contains large numbers of deer within its secure and sheltered corries. The forests of Coigach, Gildermorie, Farnnich, &c., are also famous. Besides these, the islands of the Lews and Harris are well known as affording excellent sport.

In Inverness-shire—where the deer, from the excellence of the pasture and mildness of the climate, attain to a large size—there are the celebrated Glengarry forest, about 7 miles long from east to west; Glenfeshie, containing about 13,000 acres, now used, however, as a sheep walk; Gaick, containing about 10,000 acres; Drumauchtar, comprehending about 5782 acres, now used as a deer forest by the Duke of Abercorn; Glenavon and Glenbuily, about 25,000 acres in extent, which, with Glenfiddich, in Banffshire, of about 5522 acres, form the deer forest of the Duke of Richmond.

In Aberdeenshire may be mentioned the Royal forest of Balmoral, containing upwards of 30,000 acres, and the Forest of Invercauld, containing 22,000 acres, generally considered part of the Royal forest of the old Scottish kings, and maintaining an enormous number of deer, which, from the rich pasturage in this district, are generally very fine and large. Marr Forest, also in this county, embraces Glenquoich, Glenluie, Glendee, and Glenguildy, in all about 60,000 acres, and is the property of the Earl of Fife.

In Argyleshire there is the forest of Corrichibach, in the district of Glenorchy, the property of the Earl of Breadalbane, about 35,000 acres in extent, and one of the best deer forests of Scotland. Deer are also plentiful on the estates of the Earl of Morton, Maclean of Ardgour, &c., in this county. The islands of Jura, Mull, and Skye also contain many deer; and an interesting account of the manner in which these animals are driven in Mull, has appeared in a former number of this Journal, from the pen of Mr John Colquhoun, "The Old Sportsman."

In Perthshire there is the forest of Glenartney, belonging to Lord Willoughby d'Eresby, about 3000 acres in extent, and containing about 1000 deer. The forest of Athol, perhaps the most famous in Scotland, contains about 52,000 acres, and the number of deer it maintains has been variously estimated at from 8000 to 13,000. Deer-stalking has been carried to a high degree of perfection by the Dukes of Athol in this extensive forest, and an admirable account of the sport there has been given by Mr Scrope in his work on deer-stalking, published in 1836.

Such, then, in a few words, is a statement of the important place which deer occupy in the agricultural economy of Britain, particularly Scotland; and it has been calculated that, if the deer forests were turned into sheep walks, it would add about 400,000 sheep to the permanent stock of the country. It is, no doubt, true that they bring a considerable revenue to the proprietors of them, but it has been urged with some reason that they act prejudicially by draining away the population from districts which otherwise might support many stalwart Highlanders and their families. These, however, are questions for the political economist to settle, and with him we leave them for the present.

[illegible] INCREASED AGRICULTURAL PRODUCTION OF THE BRITISH ISLANDS.

[illegible] production of [illegible] having nearly [illegible] maximum of its capability [illegible] by no means uncommon or unpopular impression on the subject. Such a notion, however, for reasons that will be presently adduced, is erroneous, and can only obtain with persons wholly uninformed on the subject, or who may not have given the productive power of the soil of Britain due consideration. So far from a ***maximum*** of the productive power of the soil of Britain having been attained, there cannot be a doubt that the agricultural production of the kingdom th in grain and in live stock, may be ıny times what it now is, by proper eans being taken for that end. To form an ınion with any approach to accuracy of ıe *ultimate* limit of the production of which ıe soil of the United Kingdom is capable, nder the most judicious application of ıpital to its most perfect cultivation, is, perıps, impossible—if indeed there be any ıch limit; but it has been estimated, with very appearance of its being a correct conılusion, that the area of the British Islands ıight readily, and in a comparatively short ıeriod, be made to produce ten times that rhich it does at present. The reasons that ıave previously herein been adverted to, for he capability of a very greatly increased ıgricultural production of the United Kinglom, are the following, viz.:—That, notwithtanding the encouragement that has, during ıpwards of twenty years past, been offered by iovernment and by other sources for the ıperation being undertaken, not less than o,000,000 of acres of land in the United Lingdom are, it is said, at the present day ı a state of greatly inferior fertility from 'ant of being drained; fully 10,000,000 f acres of moorland in the three sections of ıe United Kingdom are represented to be apable of immense improvement as sheepralks, but which, in their present natural tate, are almost wholly worthless; many xtensive estuaries of the large rivers disharging into the sea on the coasts of the ıritish Islands are capable of being reclaimed nd rendered immensely productive; and of ıe cultivated portion of the United Kingom—great as the progressive improvement agriculture has been since the commenceent of the present century—no part whatter has been brought to an approach to the gree of productiveness of which it is pable, and very much may be made to ıld many times that which it now does. It ıy be asked why, with the encouragement the great National, and also by the numeıs provincial and local societies of Engıd, Scotland, and Ireland, for promoting : improvement of agriculture, so important ıranch of national industry should be in the unadvanced position which it has been stated above to occupy? This, it may be answered, arises from the capital at present employed in the cultivation of the soil being wholly inadequate to any better cultivation than now prevails, or, what may be more correctly expressed, though to the same effect, by the statement of an almost universal desire by professional agriculturists to hold a much greater extent of land than for which they possess a sufficient capital to manage with advantage, either to themselves or their landlords, or with benefit to the community at large. It may, with perfect truth, be remarked that there is no industrial vocation in which capital is so necessary to successful results as in agriculture; and yet there is none in which this most important element of successful enterprise is so frequently and so greatly deficient. The dependence of late years of the British people on the products of foreign countries of from one-fourth to more than one-half of their required annual supplies of bread-stuffs, and for a very large portion of their requirements of live stock, together with large quantities of other corn than wheat, salted provisions, dairy produce, and other articles of food, renders it imperatively necessary that the productive power of the soil of Britain should be very greatly increased without delay. This country being now on the eve of a scarcity, almost amounting to an absolute dearth, of a staple article of food of the British people—viz., that of butcher meat—to an extent as to prevent reasonable hope of being adequately met by importation from abroad that may take place, will cause the price of the article in question to rise so high as to preclude its consumption by a large portion of the working-class of the population to whom its use is more needful than to the rest of the community, renders it still more urgent that the increased production spoken of should be commenced without loss of time, and its progress advanced with the utmost possible rapidity. How long the serious evil referred to may continue may be matter for speculation; but it is only too probable that so lamentable a state of things will, to a great extent, become permanent in this country, unless the animal food of the people, of home production, be very greatly and speedily increased.

The increase of agricultural produce of home growth rests entirely with the owners of landed property throughout the United Kingdom, in which it is their part to permanently improve their estates, to an extent and in a manner that may be required for the most perfect cultivation of the soil; and also to so adjust the size of the farms or holdings to the amount of capital possessed by tenants that such amount may be fully adequate to every requirement for the utmost increase of production. Whatever may have been the obstacles upwards of twenty years since to landowners obtaining the means of improving their estates, these no longer exist; as at the present time, capital to any amount may be obtained, by way of loan, on the security of the improvement contemplated, for carrying out permanent improvements of any description whatever of landed property by means of the several Land Improvement Companies, which are now established both in London and Edinburgh. It is not for the improvement of est alone that the owners can obtain ance referred to, but it extends to t estates of tenants for life of entailed and the loans in question being re a rent-charge on the property, ten a few years, the most important an improvements may be effected by t referred to, not only without any ever to the owner, when tenants pa charge as an increased rent, in consi an immediate increase in the val property as the results of the imp but in a few years, at the terminati period of the rent-charge, he will c receipt of a largely increased annu from the property. Such advanta suggested to be derived from the ment of their property ought sure most potent inducement to the landed estates in the United Kingd the necessary measures for the i the productive power of the so British Islands, which, in the existi stances of the country, has been be so urgently required.

THE ADULTERATION OF SEEDS BILL.

PROBABLY no bill ever introduced before Parliament has ever met with so favourable a reception as that of the dulteration of seeds, which stands for second eading on June 16th. The members of the eed trade, as a body, if they do not give it hearty and an active support, maintain at east a judicious silence; while some few hew considerable anxiety to press it through it stands. Farmers and Farmers' Societies, nd even Chambers of Agriculture, shew an nanimity which is both pleasing and suggesive as to the propriety of imposing penalties pon wrong-doers; and we need hardly say hat we cordially concur in imposing pains nd penalties upon all such as are guilty of raudulent practices hose which have been described by the sub-commit Council of the Royal Horticultural

The practice of killing the seed the bulk, and colouring them to de buyer, which we so strongly denou 289, and which has passed an ordea public censure, is sufficiently dealt third clause of the bill, reading thu

> "Whosoever shall destroy or kill, or destroyed or killed, by any process o scalding, kiln-drying, baking, fumigatin artificial means of any kind, the vitality or power or principle of any seeds, or sh impart, or cause to be given or imparted, of any kind, by any process of colouri sulphur-smoking, or any other artificial appearance or likeness of any seeds of any or a false or deceptive appearance, shall

> e against this Act, and shall for every such on summary conviction thereof before the e liable to and shall forfeit and pay such and costs as hereinafter in that behalf pro-

enalty, not exceeding £50 and costs, exacted from offenders; and if the ctice be repeated, in addition to the sums being mulcted, the party's occupation, place of abode, and of business, and particulars of his con- is and punishments under the Act, may lished by the informant and prosecutor, the expense of such offender, in such aper or in such manner as the court think fit, and allow the informant, or utor, as part of his costs, a sum not ling £5."

s appears to us sufficiently severe to he ends of justice, and for ever will, at all in the case of houses that have regard racter and position, put a stop as far y are concerned to such unwarrantable g. Some houses of high standing re- e with a tone of innocence the charge ing, either knowingly or unknowingly, ed seeds, in the sense which the Act and they look upon Parliament deal- ith the whole question as a measure ly of out-door relief, but of plain justice mselves. They maintain, truly enough, hey have been handicapped by the of unscrupulous dealers, and that if gh investigation, periodically or other- takes place, they have much to nd nothing to lose. They aver that ers who have dealt with them on a fair erative principle, could be cited to that the vitality and germinating power ls supplied, have at all times given them ost unqualified satisfaction, and that hey have been perfectly cognizant of nefarious practices in vogue, they erfectly helpless in dealing with them.

seems a chord of sympathy, notwith- ng the rivalry common to "two of a ' to flow in the direction of a general against the public as being the more le of the two in its position of buyer, to a tendency to run down prices to such a minimum as to induce the unfair competition to be set a-going. This may be an accurate enough rendering of an existing practice, but it cannot bear the face of day. If the seller takes a determined stand with his samples, the buyer eventually must "cave in;" and if a lower-rate article be demanded, why then avow its quality.

The bill presents no loophole of escape in this direction with reference to killed seeds or dyed seeds; but it does not virtually exclude the sale of old seeds, although it emphatically warns the seller that he shall not sell seeds weak in vitality as nett seeds with impunity. The seller may yet, therefore, dispose of seeds of low average in vitality, provided they are not killed or doctored in the variety of ways which have been shewn up during this investigation; but if it can be proved that they have been manipulated in any way other than what is just and proper, the Act intervenes with its accompanying penalties. There will be considerable difficulty in reaching the roguishly inclined character with reference to killed seeds. We know no more thankless task imposed on any one than an investigation of this kind. Capital practical men will be cited, prepared to prove that it was the inclemency of the weather, the character of the soil, and the thousand enemies of plant life that teem upon the earth, that destroy germination; and what judge will have the hardihood to enforce penalties if evidence of this kind be forthcoming, even supposing there were apparently good grounds for a committal? The great commercial public will still be at the mercy of their seedsmen, even although this bill passes, with clauses even more stringent than what is proposed shall be enacted. We have no wish to throw cold water upon the laudable efforts of those who are committed to see this bill pass; we would rather encourage them, believing it will effect much good, but we are by no means insensible to the slippery points that are visible throughout, and we only timeously direct public attention towards them.

One good thing is gained throughout the investigation into this adulteration proc and that is, that the public themselves are now let into the secret. Aforetime a sweeping majority were buying upon trust, and when the per-centage turned out unsatisfactory they were at a loss to know the cause, and had some qualms as to whom they should assess the blame upon. Their eyes are now opened, and it will take some time to divest them of a suspicion rightly or wrongly formed. As a rule, the great majority will pay a fair and reasonable price for the article, but they will be equally exacting as to its quality. The desire to stand well with the customer will exercise a far more powerful effect upon a "loopy" or dishonest character than the fear of being detected and hounded towards a court of justice upon a point or two which will be, as we have shewn above, exceedingly difficult to explicate. Good houses will flourish by the names which they bear, and patronage will flow at an increasing pace—all the more swiftly, certainly, if confidence is established that the *bona fide* article is there for the purchasing.

There will be always this defect in every kind of seeds, however carefully grown and harvested, which Professor Buckman has long since adverted to—the introduction, less or more, of seeds of weeds. No bill can reach this to deal off-hand with it. Such seeds as groundsel, crowfoot, dandelion, and charlock, are wafted for miles, and pollute many choice seed fields of clover, and even turnips. What are not wafted on the wings of the wind are carried by birds; and pollution in this way takes place in hundreds of well-kept fields. The nursery farmer would do well to exercise a very careful segregating process in harvesting his seed crops, and with it all seeds of weeds that it is impossible to prevent being present. With great care, however, they can be reduced to a minimum, and scarcely destroy the good quality of the article in request. But the converse often happens, as Professor Buckman has announced to the whole agricultural community that he has found no less than 50,000 seed-weeds in a single pint of clover, and 15,000 of the same unremunerative stock in a pint of linseed! This, however, is an extreme example, but it shews the necessity for watchfulness on the part of those who have the little bills to pay. Many grievances are put down by the strong hand of the Legislature, and many crop up of such a nature as can scarcely be brought within its lash, and this is one of them; but there still remains the potent influence of public opinion; and let the withering scorn of contempt follow those who knowingly or carelessly permit such mixtures or counterfeits to pass current into the market.

Farm Architecture.

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ROOFS FOR FARM BUILDINGS.

IN continuation of this subject, we give, in fig. 1, an illustration of a roof of a barn or granary, of 20 feet clear span, which consists of a pair of rafters and a collar beam, length 6 inches by 3.

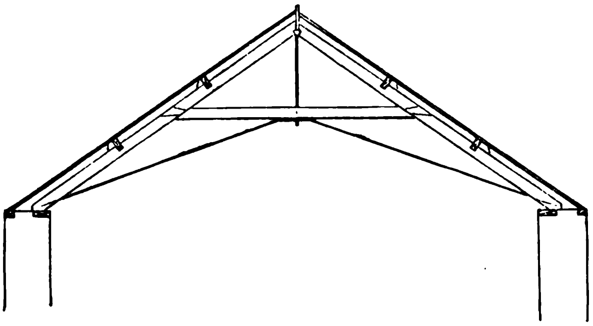


Fig. 1.

It has a suspending rod from the meeting of the heads of the rafters to the under edge of the collar at its mid length, where it is met by a brace from the foot of each rafter. The suspension rod and braces are to be ¾ of an inch in diameter. The lower ends of th rafters should have plates to resist the pre sure of the braces. The span of this and th last described forms of truss may be the sam as that of the first described. The object (the particular form of truss here described to save height in side-walls in the case of granary, and to obviate obstruction to th building up of a mow of corn in straw in barn.

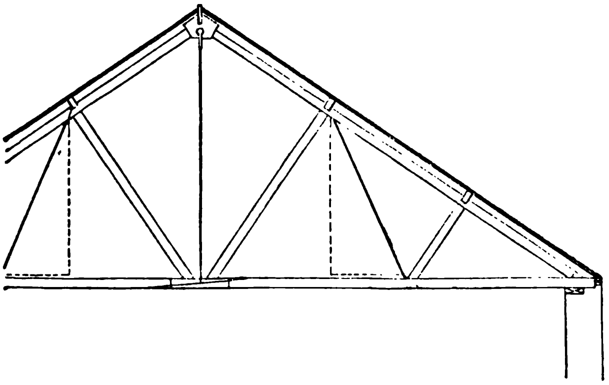


Fig. 2.

Fig. 2 is a truss which may be adopted in a roof of from 24 to 36 feet span. The figure represents a truss for a span of 30 feet, and consists of a pair of rafters and tie-beam, with two struts to each rafter. The rafters and tie beam need not exceed 4½ inches by 3 inches, when the span of the roof is under 30 feet; but for spans of 30 feet and upwards, the scantling of these members of the truss may be increased to 6 inches by 3 inches.

The longer of the struts in both cases may be 4½ inches by 3 inches, an shorter struts 3 inches square. The kin and longer braces for the less span m ¾ inch diameter, and the shorter b and the bolts at the feet of the rafte inch in diameter; and for the greater s the king and longer braces should be 1 diameter, and the shorter braces and bolts at the feet of the rafters, ¾ inch meter. The pitch or height of this should be one-third the span or bread the building.

The Farm.

THE NEW SYSTEM OF MANURING CROPS.

TO make what follows understood, and especially to those of our readers to whom chemistry is unknown, we are obliged to give some definitions :—In chemistry, we mean by *an element*, the body or substance which we cannot decompose. This is why the element is called by the name of "a simple body." Water, for example, may be decomposed. When so, we find that it is composed of two bodies, oxygen and hydrogen. If the chemist treats these two bodies with all the means that science, as put at his disposal, affords, he will be able to draw no more than oxygen and hydrogen from it; he cannot decompose water further. These are then two elements, the two simple bodies. It has not, however, been shewn yet that an apparently undecomposable body may not be decomposed by a more advanced science. There are even chemists who suppose that some day all bodies will be brought back to one single and sole atom. However that may be, we reckon at present sixty-four simple bodies or elements.

Vegetables, to whatever kind they belong, are resolved into the following fourteen elements:—*Organic*—Carbon, hydrogen, oxygen, nitrogen. *Mineral*—Phosphorus, sulphur, chloride, silica, iron, manganese, calcium, magnesium, soda, potass. Four of these elements are called organic, because we see them combined only in organised beings; the others are called mineral, because they essentially belong to the inorganic or mineral world. It is by these different combinations that these fourteen elements constitute the extremely varied compounds which vegetables present to our notice, just as the letters of the alphabet form an infinite number of words by their various arrangements.

Burning any part of a vegetable leaves a very small quantity of matter, which we call ash. This is entirely formed of mineral elements. The part which was consumed, and which was more considerable, is formed of organic elements. The relative proportions of the organic and mineral elements vary not only in one plant from another, but even in the different parts of the same plant, and at different times in the growth. Thus, 100 parts of dried vegetables contain, according to Berthier :—

Trees.	*Mineral Elements.*
Poplar	0.20
Maple	
Cork	
Fir	0.83
Birch	1.00
Hazel	1.57
White mulberry tree	1.60
Elder tree	1.60
Mahogany	1.60
Ebony	1.60
Average	0.99

Grasses, Cereals, &c.	*Mineral Elements.*
Hay	3.70
Maize	4.10
Flax	4.10
Rye (straw)	4.00
Wheat (straw)	4.00
Jerusalem artichokes	8.40
Peas	8.10
Lucerne	8.90
Vetch	10.10
Tobacco (Havannah)	11.25
Tobacco (North dept.)	18.67
Average	7.84

The following tables, borrowed from M. Georges Ville's work, will shew the different quantities of mineral matters contained in the different parts of the plant :—

Wheat—Minerals contained in 100 parts of dried crops at 120 degrees.

	Roots.	Straw.	Husks.	Seeds.
Phosphoric acid (1)	0.12	0.10	0.33	0.96
Magnesia	0.14	0.17	0.17	0.28
Potass	0.22	0.66	0.72	0.70
Chalk	0.27	0.42	0.33	0.07
Soda	0.06	0.13	0.07	0.02
Oxide of iron	0.43	0.02	0.12	
Sulphuric acid	0.09	0.25	0.18	
Chloride	traces	0.03	0.05	
Soluble silicum	1.13	0.90	5.	
Sand & insoluble sil.	5.03	1.34	5.54	

In one hectare.—Dried crops at 120 degrees.

Roots	.878	4.733 kilog.
Straw	1.922	
Husks	.470	
Seeds	1.463	

Division of Minerals.

	Kilo. Roots.	Kilo. Straw.	Kilo. Husks.	Kilo. Seeds.
Phosphorus acid	1.16	1.88	1.48	14.09
Magnesia	1.33	3.28	0.73	4.19
Potass	1.95	12.63	3.39	9.99
Chalk	2.60	7.99	1.54	1.12
Soda	0.60	2.48	0.32	0.36
Oxide of iron	3.83	0.33	0.55	
Sulphuric acid	0.86	4.79	0.84	
Chloride	traces	0.60	0.25	
Silica	0.11	17.32	23.24	
Sand & insoluble sil.	44.16	25.75	26.02	

Beetroot—Minerals in 100 dried parts.

	Roots.	Leaves.
Phosphoric acid	0.58	1.28
Magnesia	0.32	1.73
Potass	1.74	2.95
Chalk	0.43	2.18
Soda	0.82	1.68
Oxide of iron	0.03	0.19
Sulphuric acid	0.15	1.43
Chloride	0.06	0.52
Silica	0.07	0.37
Sand and insoluble silica	0.37	1.81

[illegible] one hectare.

[illegible]	[illegible]	0.214 kilog
[illegible]	[illegible]	

[illegible]	[illegible]	[illegible]
Sulph[illegible]	[illegible]	[illegible]
Chlorid[illegible]	[illegible]	.35
Silica	[illegible]	[illegible]
Sand [illegible]	[illegible]	[illegible]

The divisions of the mineral elements in plants are not due to chance. In the general plan of nature the seeds secure the continuation of the species. Moreover, the seed, or rather the kernel of the seed, is the first medium in which the embryo will be developed, and, as such, it ought to present all necessary materials for the development of the life of the plant. The greatest part of the substance of vegetables is made up of elements which we have named organic, and amongst those oxygen and carbon predominate. Thus, on an average, the analysis gives—

Carbon	50 per cent.
Oxygen	45 to 50 „
Hydrogen	5 „
Nitrogen	.05 to 6 „

The mineral elements, like the organi elements, do not exist in the same quantity i the different plants, nor in the different pa of the same plant.

These are, according to Boussingault, t relative proportions of the organic eleme of some plants.

	Carbon.	Hyd.	Oxy.	
Straw of wheat	52.1	5.7	41.8	
Straw of rye	52.8	5.8	42.1	
Straw of oats	52.8	5.7	41.1	
Beetroot	45.7	0.2	36.3	
Turnips	46.3	6.0	45.9	
Straw of peas	51.5	5.6	40.3	2.
Red clover	51.3	5.4	41.1	2.
Straw of Jerusalem artichokes	47.0	5.6	47.0	0.4
Average	49.06	5.75	43.0	1.24

If we compare the trunk, the branches, and the leaves, we see that the difference is hardly perceptible, saving the nitrogen, of which the leaves contain a larger quantity.

	Carbon.	Hyd.	Oxy.	Nit.
[illegible]	50.60	6.16	42.13	1.04
[illegible]ches	51.78	6.30	40.76	1.13
[illegible]es	51.83	6.53	39.52	3.42

ut in all parts of vegetables there are ds which contain more nitrogen than others. We can judge of this by the following table, borrowed also from Boussingault:—

	Nitrogen, per cent. Straw.	Seeds.
it . . .	0.33	2.46
. . .	0.30	1.70
. . .	0.40	2.30
y . . .	0.26	2.15
. . .	1.95	4.30
ls . . .	1.62	4.00
adel . . .	0.66	4.00
. . .	0.86	3.50
alem artichokes.	0.40	1.70

ents, of which we are going to take
iefly, form, by combining them-
arious proportions, the immediate
of the organization of plants.

rinciples are divided into two prin-
ps, according as they contain three
ganic elements. Those of the first
tain oxygen, hydrogen, and carbon.
rs contain, besides these, nitrogen.
l first glance at the most important
roups.

ants of the first group have this re-
particularity, that we may look upon
ontaining more of carbon than of

se.—This substance forms in a
he framing of vegetables, and, re-
to say, its adjustment is identical,
in all vegetables, but even in the
parts of a plant.

earance and its physical properties
varied; hardy enough, and of strong
powers in the wood and straw, it
very compact in the stones of cer-
s, spongy in the pith of the elder tree,
les itself in delineated fibres in the
hemp. The cellulose is insoluble

or Starch.—If we mix up under a
f water wheaten flour, there runs off,
pouring, a whitish matter; this is
la. There remains in the hand a
nous matter; this is gluten.

The fecula settles down in the water in particles of a pure white colour. It is insoluble in cold water, but dissolves in boiling water, and forms a kind of jelly called starch, frequently used in the arts. The fecula, dried and exposed to a temperature of 200 deg., takes an amber colour without losing anything in weight. It, however, undergoes a decided modification, and is transposed into a substance very soluble in water, from which it has got the name of *dextrine.* Boiled in water, to which is added some centimes of sulphuric acid, the fecula is transformed at first into *dextrine;* then, if kept boiling, it transforms itself in a time into *glucose,* or grape sugar. At the time of germination it forms in the seeds a substance called *diastase,* which has also the property of transforming the starch into *dextrine* and into sugar.

Every one knows what a profit breweries and distilleries have by the faculty which seed possesses for germinating sugars. The sugars are substances soluble in water, endowed with a sweet savour, and possessing the property of being converted into alcohol and carbonic acid when fermented. Chemists admit three chief kinds of sugar—1, cane sugar; 2, grape sugar; 3, sugar which does not crystallise fruit. Cane sugar remains in solution in the juice of a great many vegetables—in beetroot, in the turnip, carrot, maple, and in the stems of wheat, it is contained. The sugar of the raisin is that which forms the whitish matter which we see on the surface of dried grapes, and which forms the sugary seeds we get in the inside of them.

The glucose, which we have seen resulted from the transformation of the fecula, appears to be identical with the grape sugar.

We shall pass over the other less important bodies of this group, as the study of gums and starch is not very interesting to agriculturists.

POTATOES AND THEIR CULTURE.

IT would be a fruitless task to name the different sorts of potatoes in vogue in the different parts of the country, for indeed the same kind goes by dissimilar names in varying localities. There is no well-defined kind that was cultivated before the blight appeared that is now in repute; in fact, the chief kinds then cultivated are now unknown. Some have lost the character which they first possessed, and new and prolific kinds have established themselves, some of them of a persistent character, and others less so. But, irrespective of particular sorts cultivated, there are chiefly three properties that should determine the choice of seed, namely, *productiveness*, *earliness*, and *mealy quality*. There are other points of little less importance to which regard is paid, such as soundness, size, and shape. The minutest characteristics of the parent are transmitted to its progeny, but potatoes are prone to *sport*, as the gardener terms it, and be transformed, unless a judicious change of seed is occasionally made. They are not less liable to degeneracy than change. We have known the same sort cultivated for successive years on contiguous farms; on the one farm they declined so much as to become a positive loss, while on the other they maintained all their qualities unimpaired. Subsequent to the great blight in 1845, some selected their seed from poor soils in late districts, but the practice was ultimately abandoned as unprofitable. New ground and virgin soils are more reliab[illegible] one sort is respectable and pastoral distr[illegible] where [illegible] useless or [illegible] experimenter lays it down as a guiding point, that the seed should be taken from the top tubers; but this view is not generally held, nor observed in practice. Some plant middle-sized whole potatoes as sets, and this is without doubt a good practice in light soils with little rainfall, for the cut pieces bleed and dry so much as to impair considerably their vegetative powers, and sometimes, indeed, in dry earth they fail entirely. Still, in the worst conditions as to dryness, where whole potato sets are a necessity, a little piece should be cut away to accelerate the decay of the tuber for the nourishment of the sprout. When potatoes are cut for seed, it is best to cut from the nose or thick end, so as to limit the number of stems, and thus give strength to one or two haulms from one root instead of weakly clusters of stalks.

There is a peculiarity in the formation of the tubers that is worthy of notice. If a plant is placed in a situation where it can procure as much food as it can possibly consume, the top comes away luxuriantly, often rich in blossoms and plums, but the roots are invariably wet and soapy. At other times we have seen an excess of luxuriance lead to a complete abortion in the tubers. Likewise the unobstructed growth of the roots in a cellar often leads to a like result. It has been found that the cultivation of early varieties is not so profitable for a succeeding crop. This may be due to the greater exposure of the soil, and the longer time of that exposure than what happens with later varieties which, as a rule, have more luxuriant haws. Farmers in the early and dry districts of the country often speak of this, since potatoes have taken a prominent place in husbandry. We have heard Forfarshire farmers, as well as those in the potato districts of Berwickshire, say that their succeeding crops of wheat and barley are sometimes

or a quarter and a-half short of
ties obtained after heavy-haulmed
that are lifted about the end of

opriety of pulling the flowers or
from the potato, so as to prevent
rom forming, has been a matter of
among potato growers; but we
his, as well as many other points
ionally come to the surface, that we
to appeal to "the wisdom of our
" for what may be regarded as a
y solution of the question. Many
e farmers in olden times prosecuted
iment with great care, and invariably
at the removal of the blossoms
an increased produce. We have
report of Mr Wilson, Deanside,
ire, who, according to all accounts,
ulously precise in all his undertak-
, in the years 1803 and 1804, cul-
is potatoes according to the usual
drills, and planted in farm-yard
By taking alternate portions of
a in the same field, pulling the
from some of these divisions, and
hers to ripen the seed, attending in
n when the potatoes were taken up,
uring the produce with great care,
nly found both years the quantity
from 10 to 15 per cent. where the
were taken off. The quality was
h improved by the early ripening,
were fewer small potatoes. Having
rtained that the quantity and quality
rop was improved by pulling the
e continued the practice, and it paid
many times over. It is further
t in 1808 he had 65 bolls an acre
ld where the blossoms were pulled.
ten and twelve years of age, at 6d.
were employed to do the work, and
ses amounted to about 3s. per acre.
a number of varieties that produce
m at the present day. We have
tivating several sorts of potatoes
period of the potato blight, and
thrice found plums fully matured.
ve lately read a pamphlet that was published last autumn, intitled "The Potato Disease: its Cause and Cure," in which the plucking of the blossoms is denounced as a fallacy and a mistake. This work is the production of Mr Taylor, of Howwood, a small hamlet in Renfrewshire, and has received prominent notice in some agricultural newspapers. He ascribes the disease to overcrowding, forcing, heating, cutting, and bleeding throughout a long series of years. Mr Taylor is known and acknowledged as a gentleman possessing capital abilities; but we don't think that there is much light shewn on this mysterious subject in his publication. The potato disease is still as much a secret as ever, and that is a strong reason for trying to find out what would prevent it. So far Mr Taylor's attempt is worthy of all praise, and there is every probability that this crop would be less liable to disease if a return were made to the treatment followed in the times of our fathers and grandfathers; and this is all that he suggests in relation to the "cure." We have seen a notice of the work by Mr Nesbit, farm-manager to Sir John Pakington, Bart., and our views are very much at one with his. He says, "Mr Taylor's views are very plausible, and might be well suited for the cultivation of potatoes in a gentleman's garden, where profit is no great object; but his proposal, for example, of 3 feet 6 inches between the rows would be very unprofitable for a farmer who cultivates 20 or 30 acres. In the course of his remarks he objects to storing in pits, which, in my opinion, is the only means of preserving them against frosts." Mr Taylor tells us, when he was a boy he was employed to pull the flowers from the plants to prevent the apples from forming, and says that the work is perfectly useless. We have no information from him of experiments being made to prove his statement, and therefore his assertion in the absence of proof goes for nothing. We have the contrary doctrine proved by accredited gentlemen, and we are bound to believe them. It is in accordance with law, and is well supported by analogous cases.

It is a generally received opinion, and accords with the recommendations of the pamphlet, that, in order to diminish the disease which has appeared to more or less extent each season since the year of the great blight, and to restore this valuable esculent to its pristine vigour, we must go back to the practices of our ancestors. The scab and the curl were then the only diseases, and means are now known how to prevent their appearance, and it is within the range of possibility—I may say probability—that a remedy may be found for the fatal blight. When potatoes were first introduced into field culture, the crops produced were heavier than those now grown. Of this we have ample testimony. Dr Keith of Keith Hall writes that he had 12½ tons of excellent potatoes on the acre, as far back as the year 1772; and be it remembered that there were then no stimulating manures to bring away and increase the crops. In an able and systematic work of three octavo volumes, written in the end of last century by Mr Donaldson of Dundee, he says that there is not an old woman in North Britain who is not as good a cultivator of potatoes as the most expert farmer. The culture of potatoes appears then to have been a simple matter; but the industrious wife of the farm-servan for the most part digged and pla kail-yard attached to her dwelling by long practice in a small way pic much experience as the farmer, who t no greater breadth in the field than w plied his household. In minute att circumstances, exactness of executi economical management, she woul probability excel the farmer. T lections in the ash-pit not far fr cottage door, would amply dress the a garden with the best of manure—co among other enriching ingredients, o of broom and whins, and also of peats. The manure would thus abundance of potash, one of the chie substances that enters into the com of potatoes. We meant to have poi a method of getting a supply of pot an early period of the season in an e cal manner, and also a most expeditio of cultivating them with the spad method followed in Lincolnshire s potato disease appeared, would, we interest many of our readers. The topics, with remarks on several phas disease, will, in an early number, f subject of another paper.

CULTIVATION OF CHICORY.

HAVING in a late number discussed the points connected with this crop, referring to the soil to which it is best adapted, the manure which it requires, and its place in the [illegible] now proceed to consider that [illegible] the preparation of the land [illegible] preparation of the land [illegible] exercised [illegible] wheat or rye [illegible] cereals are gathered, the [illegible] the land is proceeded with. After being allowed to lie eight or ten [illegible] then harrowed to level the surface; and after another lapse of fifteen days it is again ploughed. W autumn ploughing is much more b than spring. On very small farms t paration is done by the spade. The is then turned up to a great depth, an well over on the surface, a small qu the subsoil being put on. This o the double advantage of in without expense, the depth of the ara and of favouring, in a singular mar growth of the root.

The use of the spade would be im on a great scale; we must, therefore, r by the plough. By the aid of it we

arable bed to the beginning of the
; we make it follow to a depth which
bottom without bringing it to the
The conditions in which it is
knowing the soil upon which we
nd the circumstances of time and
ught and can alone decide the ques-
knowing if it is of use or not to place
surface a quantity of the subsoil.
e spring, when the soil is well dried,
ately begin to sow; give it a good
ng with the drag-harrow, which ought
ade to penetrate as deep as possible.
arrowing is followed by a second, a
nd a fourth, done so that the harrow
tes less and less into the ground. The
of the repetition of this is to make the
art of the soil in such a condition so
e root may develop itself vertically,
t become forked; and, in the second
to reduce and prepare the soil pro-
r receiving the seed.
e action of the harrow does not suffice
erize the surface enough, rolling must
recourse to, which ought to be done
he second or third harrowing in the
f sowing broadcast; and after the
in the case of sowing by drilling seed.
ost favourable time for sowing is from
h to the 15th of May. The seed may
n as late even as the first eight days of
It is of great importance that the seed
be put in when the weather is dry.
cory is sown broadcast or in drills.
st is much less frequently used, al-
it is the most economical. By the
stem, we use from 2 to 4 lb. per acre.
our or five years old is preferred, be-
when new, it is apt to make the plants germinate too quickly. The choice of the variety of seed should be taken into serious consideration.

Weeding.—Chicory, like all other plants, is greatly the worse of being in the neighbourhood of weeds. For this cause, we have the first weeding as soon as possible; it is repeated soon after if the ground threatens to get weedy, and in any case as soon as the plant has got its fourth leaf.

The hoeing has not only for its end the destroying of bad weeds, but to move the surface so as to facilitate the circulation of the air and increase the temperature. About the same time that this is done, or some days after, we begin the thinning, which should be finished quickly. The thinning is a very important operation; the grower ought to inspect and take great care that this part of the work is well done. In ordinary conditions of fertility, the thinning to give to the plants is from 9 to 10 inches each way. This distance, however, is not absolutely fixed; one can easily imagine that the distance to be between the plants ought to vary according to the richness and fitness of the soil.

When the chicory has attained a certain degree of growth, some people are in the habit of taking from the plant a great many of the best leaves from amongst those most developed, to feed cattle with. This practice, adopted in many places instead of the use of beetroot, does great harm to the root, and such has been shewn in more than one case.

These latter remarks apply, however, to the cultivation of the crop as a root crop, not to its cultivation as a forage plant, where the leaves are used for cattle.

FARM-YARD MANURE.

IE following is the analysis of fresh
and old manure as given by Professor
r, in which the calculation is made so
hew the number of lb. weight in every
manure. From this table it will be seen
e fertilizing material of farm-yard manure is comprised within a very small bulk of matter, for in a ton of ordinary manure we get not quite half a cwt. of absolute fertilizing material, the other being made up of 13 to 14 cwt. of water and 4 to 6 cwt. of inferior solid matter. It is right, however, to

that the bulky matter is not altogether valueless, for it exercises a very important action in the soil, chiefly mechanical, opening up and loosening the particles of soil, admitting to it the ameliorating influences of atmospheric action :—

	Fresh.		Well Rotted.		Price.
	Lb. in Ton.	Value.	Lb. in Ton.	Value.	
		s. d.		s. d.	Per lb.
Water	1482¼	—	1689¼	—	
Soluble organic matter	55½	2 0	83	4 0	ammonia 6d.
Soluble inorganic matter:—					
Soluble silica	5¼	—	5¾	—	
Phosphate of lime	6¾	0 5	8½	0 6½	0¾d.
Lime	1½	—	2½	—	
Magnesia	¼	—	1	—	
Potash	12¾	3 3¾	10	2 9	3 3-10d.
Soda	1¼	—	½	—	
Chloride of sodium	¾	—	¾	—	
Sulphuric acid	1¼	—	1¼	—	
Carbonic acid and loss	4¾	—	2¾	—	
Value of soluble matter	—	5 8¾	—	7 3½	
Insoluble organic matter	577	6 9	287¼	4 3	ammonia 6d.
Insoluble inorganic matter:—					
Soluble silica	21¾	—	32	—	
Insol. silica	12½	—	22½	—	
Oxide of iron and phosphates	13½	0 6½	21¼	0 8¾	bone earth 0¾d.
Lime	25	—	37½	—	
Magnesia	3¼	—	2	—	
Potash	2¼	0 7½	1	0 3¼	3 3-10d.
Soda	½	—	¾	—	
Sulphuric acid	1¼	—	1½	—	
Carbonic acid and loss	10¼	—	29	—	
	2240	7 11	2240	5 3	
Value of insoluble matter	—	7 11	—	5 3	
Value of soluble matter	—	5 8¾	—	7 3½	
Total value of a ton of manure	—	13 7¾	—	12 6½	

[illegible] agricultural world is greatly [illegible] for having so completely and thoroughly investigated the subject of farm-yard manure, its chemical constituency, and the principles which regulate its application to cultivated land. The following statements are from Dr Voelcker:—

Compoistion of well-rotted manure (mixed horse, and pig dung).

Water 7
Soluble organic matter ... ...
Soluble inorganic matter ... ...
Insoluble inorganic matter 1
Insoluble organic matter ... ...

10

Composition of fresh farm-yard manure, comp horse, pig, and cow dung, about fourteen old :—

Water 66
Soluble organic matter 2
Soluble inorganic matter (ash).
  Soluble silica ... ...
  Phosphate of lime ... ...
  Lime ... ...
  Magnesia ... ...
  Potash ... ...
  Soda ... ...
  Chloride of sodium ... ...
  Sulphuric acid ... ...
  Carbonic acid and loss ... ...

1

Insoluble organic matter 25
Insoluble inorganic matter (ash).
  Soluble silica ... ...
  Insoluble silica ... ...
  Oxide of iron (alumina), with phosphates
    Containing phosphoric acid ... (
    Equal to bone earth ... ... (
    Lime ... . (1
  Magnesia ... ...
  Potash ... ...
  Soda .. ..
  Sulphuric acid ... ...
  Carbonic acid and loss ... ...

1C

The following is a general statement conclusions come to by Dr Voelcker :—

"Farm-yard manure in its fresh state contair small quantity of ammonia, most of its nitroge there as insoluble nitrogenous matters. But decomposition advances the ammonia increases, quantity of organic matter becomes soluble. this reason the manure should be preserved in manner as to prevent the escape of the solub tions, which are the most valuable. This effected by keeping it in water-tight pits, or cover; but, in the latter case, the manure, parti if it contain a large proportion of litter, is n ciently moist to admit of its ready fermentati water must be added in sufficient quantity to p that change. The worst of all modes of keeping manure is to pile it in heaps in the corners of the fields, for under such circumstances it is most liable to loss; and if the manure must be carted out, it is better to spread it upon the soil at once, because, when this is done, fermentation is stopped, and there is very little free ammonia, the loss is small, and the soluble matters are uniformly washed into the soil by the rain. Dr Voelcker is of opinion, that the most advantageous mode of applying the manure would be in all cases to leave it on the surface to be washed into the soil, by which means its distribution is more uniform than if it be ploughed in. The most disadvantageous mode of making manure is to produce it by cattle in open yards, for in this way at least two-thirds of the valuable matters are lost after a year's exposure."

It is right, however, as we have elsewhere remarked, to note that Dr Voelcker's opinion, that it is more advantageous to spread the manure on the surface than to plough it in, is directly at variance with what may be called the general or universal practice amongst farmers. Nor is the opinion held by other chemical authorities. It is evident, that to obtain the advantages of the "working in" which Dr Voelcker deems advisable, rain must follow the application of the manure to the soil; if it is applied, and rain does not follow, the loss of ammonia is almost inevitable. Dr Voelcker, it is true, maintains that farm-yard manure contains but a "mere trace" of ammonia in a free state, or as recently formed salts, which can be easily dissipated; and that during fermentation the total amount of nitrogen suffers but little diminution. Both these opinions are controverted by other authorities. It seems to us that if the practice of allowing farm-yard manure to lie exposed in a dung pit, or of making manure in open yards is unsound, the practice of allowing it to lie spread out in the soil must be unsound also, even although, as Dr Voelcker maintains, farm-yard manure deteriorates by exposure to the air, not because its ammonia is dissipated in the air, but because the soluble matters are washed out by the rain. It seems doubtful whether this ammonia is retained, as Dr Voelcker maintains it is. We know that we can smell the evolving gases of a manure heap, and this smell is evidence of the escape of either a carbonate of ammonia or of sulphuretted hydrogen, both fertilizers. The practice, therefore, of ploughing in the manure, as generally obtained amongst farmers, may be set down as the right one, but, general as it is, it is but right to state that some farmers adopt the contrary method.

In the conclusions to which Dr Voelcker has come, and above given, it will be noticed that he refers to the keeping of farm-yard manure under cover. This when properly managed is unquestionably the best way, and the weight of scientific evidence is decidedly in favour of it. Nevertheless, there are many who prefer to treat the manure in heaps properly constructed. Perhaps the best mode of managing dung heaps is that given by Mr Lawrence in his little handy book, and which we reproduce here :—

"Some three or more spots are selected, according to the size of the farm, in convenient positions for access to the land under tillage, and by the side of the farm roads. The sites fixed on are then excavated about 2 feet under the surrounding surface. In the bottom is laid some 3 or 4 inches of earth to absorb any excess of moisture. The manure is evenly spread, and well trodden as the heap is forming. As soon as this is about a foot above the ground-level, to allow for sinking, the heap is very gradually gathered in, until it is completed in the form of an ordinary steep roof, slightly rounded at the top by the final treading. In the course of building this up, about a bushel of salt to two cart loads of dung is sprinkled amongst it. The base laid out at any one time should not exceed that required by the manure ready for the complete formation of the heap, as far as it goes; and within a day or two after such portion is built up, and it has settled into shape, a thin coat of earth, in a moist state, is plastered entirely over the surface. Under these conditions, decomposition does not take place, in consequence of the exclusion of the air, or, at any rate, to so limited an extent, that any ammonia is absorbed by the earth, for there is not a trace perceptible about the heaps.

"When heaps thus formed are resorted to in the autumn, either for the young seeds or for ploughing on the stubbles, after paring for the succeeding root crop, the manure will be found little diminished in quantity, and unimpaired in quality—in fact, simply consolidated.

"Decomposition then proceeds within the soil, where all its results are appropriated and rendered available for the succeeding cereal as well as the root crop.

"It would be inconvenient to plaster the heap, were the ridge, when settled, above 6 or 7 feet from the ground level; the base may be formed about 10 to 12 feet wide, and the ridge about 9 feet above the base, v settles down to about 7 feet; this may be extended to any length, as further supplies of manure require removal.

One man is sufficient to form the heap, and it is expedient to employ the same man for this service, who soon gets into the way of performing the work neatly and quickly. We have been asked where a farmer is to get the earth to cover his heaps. It may be answered, keep your roads scraped when they get muddy on the surface during rainy weather—in itself good economy—and leave this in small heaps beyond the margin of your roads. This, in the course of the year, will be found an ample provision for the purpose, for it is unnecessary to lay on a coat more than 1 or 2 inches in thickness, which should be done when in a moist state. The soil left on cleaning the roots for the stock at the stores will contribute much for this purpose.

"Farmers who have not been in the habit of bestowing care on the manufacture and subsequent preservation of their manure, and watching the results, have no conception of the importance of this."

PREPARATION OF THE SOIL FOR THE TURNIP CROP.

BEFORE proceeding to the immediate subject of our paper, it will be well to glance at the leading peculiarities of the plant itself, and of the soil best calculated to produce abundant crops of it. The most casual observer must have noticed one point in connexion with the plant—namely, the enormous size of the root as compared with the smallness of the tiny seed from which it is produced; and, in further taking note of the fact of the comparatively brief period which elapses between the time in which the seed is put into the ground, and the growth of the root completed, that it must draw largely, very largely, from the sources of nutriment provided for it. These sources are the atmosphere and the soil, the plant drawing from the atmosphere by means of the widely extended surfaces of its leaves, and from the soil by means of the highly developed range of its rootlets. The important part which these rootlets play in the economy of the plant can best be seen by carefully removing ne soil from around and under a developed oot, and observing how numerous these ootlets are, proceeding from many parts of surface, but principally from its central ot or tap, and to what a depth the rootlets xtend. From these peculiarities of the plant ven the most casual observer may safely predicate that two elements in the cultivation of he crop are essentially necessary—namely, bundance of room in the soil in which the nd their connected rootlets can develop themselves, and a finely pulverized condition of that soil, so that these rootlets may have liberty within the widest possible range to extend themselves laterally or vertically, as the necessities of the plant may require.

One characteristic of the soil adapted for turnips which may be deduced from the above remarks is, that it must be what is technically called free and deep—that is, free in the sense of being friable so as to be easily pulverized or brought into condition of fine tilth; and deep—that is, in the sense of being in such a condition that this pulverized condition can be extended to a considerable depth. This character of soil is known as loamy, and frequently further distinguished as turnipy soils, as being opposed in character to the heavy or wheat land. Unfortunately, the chemical constituents of the soil which the plant demands is not met with in the above class of soil in which the mechanical conditions of the soil are best produced; the chemical constituents being met with in the heavier lands in the clay beds of the argillaceous formation, the best mechanical condition being met with in the lighter lands in the siliceous beds of the sandstone. Fortunately for the farmer, the deficiencies of the soil, whether mechanical or chemical, may be met by careful cultivation and judicious manuring. In the case even of heavy lands, good crops may be produced by due attention to the preparation of the soil, one of the main and essential features being autumn cultivation, followed up by careful working in spring.

While there is but one opinion as to the importance of having the soil deeply stirred and finely pulverized, there is, on the contrary, great diversity of opinion as to the condition in which the soil should be at the time the seed is about to be sown. Some maintain it to be essential that the seed should be sown in the soil when in a moist condition; others, again, maintain that it should be sown when it is dry. Let us glance for a brief period at some of the considerations which these points involve. At first sight, it would seem to be of essential importance that moisture should be in the land when seed is sown, inasmuch as moisture is necessary to insure the germination of the seed. Some carry this opinion to such a length that they strongly advocate, in time of dry weather, the adoption of the water drill system, introduced by Mr A. S. Ruston, in order to secure a proper start to the plants. The objection to the use of the water drill system, or indeed to any mode of application of water, is, to our mind, that the soil, if finely pulverized, is apt to be changed into a cloddy or concrete condition, which is entirely opposed to the requirements of the plant. In all cases where it is necessary to retain the moisture in the soil, it is essential that the preparation of land in the spring be carried on through all its processes of ploughing or scarifying, rolling or harrowing, with the utmost despatch. We here detail a method which has been found very successful. Soon after harvest, the stubble is ploughed with a deep furrow and left in that condition till the spring. As soon as the season brings dry weather, so that the soil can be properly worked, the grubber is sent across the autumn-formed ridges, which loosens the soil and tends to drag the weeds to the surface, in place of merely cutting them asunder, as done by the action of the common plough; the land is then rolled to crush the clods, and then harrowed to collect the weeds. These processes of grubbing, rolling, and harrowing are then repeated as frequentl as necessary, till the soil is brought into th proper condition of tilth. Drills are the opened with one furrow of the commo plough, dung spread in the spaces, covere by another turn of the plough. The seed i then sown by the drill, after which the rolle is passed over, completing the process.

Those who advocate the sowing of see in a dry soil advocate it for the followin reasons :—The seed placed in a dry seed-be does not begin immediately to germinate, bu lies in a dormant condition till it is rouse into activity by the rain penetrating the soil When rain sets in at the season immediatel succeeding the putting in of the seed, it i usually pretty liberal and lasting, so that th seed does not only quickly germinate, but th plants are kept vigorously growing till pas that critical period when they are so apt to b attacked by the turnip fly. On the contrary they say that if the seed is put into land in moist condition, although it begins immediately to germinate, and the plants speedily appear above the ground, the chances are that dr weather will continue, in which case the hea which in the first instance favoured the development of the plant will now so rapidl dissipate the moisture of the soil, that th languishing plants will be so weakened tha they will be peculiarly liable to the attack of the fly. Of course, those who thus advocat the sowing of the seed in dry seed-beds argu on the assumption that rain will not succee the sowing of the seed in a moist bed whereas it is just as probable, in this uncertain climate of ours, it will follow just a shortly after the seed is put into a moist a after it is put into a dry bed. Seeing als that the primary conditions of success, so fa as the habits of the plant are concerned are apparently best met by having a mois seed-bed, it appears to be the most natura mode to prepare the land by that system bes calculated to secure this condition. At th same time, we must not overlook the fac that much will depend upon consideration of soil and locality. Other points will b noticed in future papers.

SHEEP-WASHING APPARATUS.

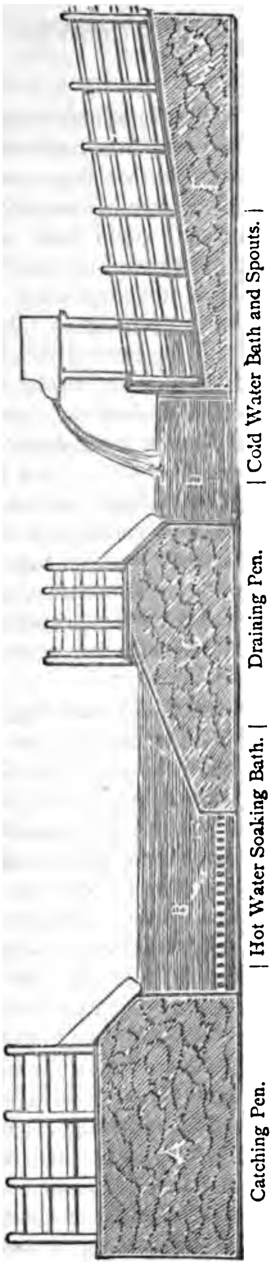
THE following description and illustrations of a sheep-washing apparatus are taken from an Australian agricultural journal. The process of sheep-washing by this method is one new to the majority of flockmasters, and is worthy of their attention :—

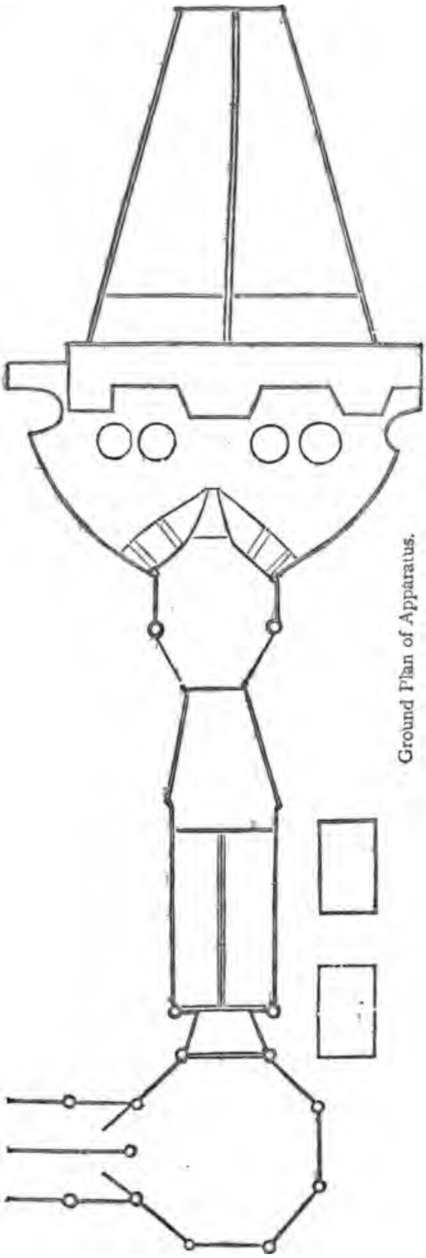
"We believe one of the most interesting subjects to our flockmasters just now is the hot-water process of sheep-washing, and getting up of wool. And we are glad to be able to give plans and some particulars of the sheep-washing apparatus of Messrs Cummings, of Mount Fyans, Australia, who, like many of our colonists, are situated where the water supply is somewhat short. Nearly the same plan of works, and precisely the same method, is adopted by Messrs Learmouth, of Ercildoun, so that we have before us the method used by two of the most successful, if not the *most* successful, of the Australian flock-masters, the Ercildoun wool winning the £250 prize, and sold in London for 4s. 10½d., and the Mount Fyans flock, the produce of which Messrs Cummings call 'native Australian,' fetched 4s. 2d. per lb. We now proceed to give a few notes on the above plans, which are engraved to a scale of ⅛ inch to the foot.

"The catching pen is about equal to 8 feet square, but the size is not material; it will save labour to have it above the hot-water soaking tank, into which tank the sheep are put by sliding down an incline. The hot-water bath has a false bottom of battens through which the dirt sinks, and is let off occasionally; its depth to the false bottom is feet, its double width, for it is divided by a batten down the middle to enable the men o get at the sheep better; its entire width is feet, its length including the slip up to the raining pen is 12 feet, and it contains 90 imperial gallons. The little draining pen nto which the sheep go should be so con-ructed as the hot water should mostly rain back into the hot-water tank; from this draining pen, the sheep are slid down into the spouting pen where there are shewn six places for men to stand, four in casks, and two in bays, so placed that they may handle the sheep under the spouts; there are three spouts, as shewn in profile in the upper plan, with a fall of not over 4 feet. These spouts are supplied either by a natural head of water, which, of course, is best, but failing this, must be thrown up by a pump. In our plan we have shewn the water descending, simply by its gravitation. From the spouting pen there is a battened way for sheep to land. And now as to the operation of washing the sheep. No more than seven minutes should elapse from the time a tolerably clean sheep goes down the slide to the soaking pen, until it leaves the men at the spouts. The water in the hot soak must be kept up to about 110 deg. The best method is to mix the soap and soda (that is, if soda is necessary) in the boilers; two open boilers of 400 gallons each will keep up the water to 110 deg. if lit early and well looked after, but when fuel is a consideration steam apparatus would be of great value. As to the special operation of washing, a sheep is sent down the slide into the hot water, the men rub soap on any special dirty parts or black tips; after remaining in the soaking for some three minutes he passes on to the draining pen, where he should remain as short a time as possible, then on to the finishing operation under the spouts, from which he should leave white, and his skin a *rosy red*, which shews he has suffered nothing from his alteration of hot and cold baths.

"The plans we have given are of works that wash their 30,000 sheep per season, and equal to 1000 sheep from eight to four o'clock. They are part masonry, but chiefly timber. No doubt the varying circumstances in which our colonial flockmasters are placed, will lead to many modifications of these plans, but though we may appear tedious by repetition,

must call special attention to one or two **ortant** elements of this operation, without which success is almost impossible. First, if the water is hard it must be softened by soap, not soda alone, and next it mus kept up to 110 deg. Fahrenheit, besides w the sheep must be kept in a clean pad for a day or two till shorn."




Ground Plan of Apparatus.

ON SOME POINTS CONNECTED WITH THE SCIENCE OF CATTLE FEEDING.

IN a former paper in this series (p. 111) we drew attention to the difficulties attendant upon the ascertaining of the real feeding value of any food as applied to any one animal or set of animals, by and through the agency of analysis alone; and we took occasion to point out why this was likely to be so, in consequence of the number of modifying circumstances met with in practice, not only arising from the difference in the constituents of various specimens of the same food, but in the physiological differences in the animals partaking of it. Before following up in sequence the other points taken up and discussed in the last two papers, we think it will be useful if we devote this to giving some very suggestive remarks bearing upon the points above alluded to from a report by Mr Harris, sent in to the New York Agricultural Society, in reply to a request by the Committee of that body that he should state the feeding value of certain cattle foods.

"Before an estimate can be made (says Mr Harris) of the worth of an analysis to ascertain the nutritive value of a grass, it is first necessary to determine what it is that constitutes nutritive value. In the case of a concentrated food like oilcake or grain, this is not difficult. The grain is a ripe product. Its constituents are fully organized, and the amount of these can readily be ascertained, and we can form a tolerably correct idea of their value. But with succulent vegetables, such as turnips, grass, &c., the case is very different. The ingredients are in a transition state. They partake more or less of the nature of the sap from which they are formed. They are not fully organized, and *inorganic matter will not support animal life.*

"When I was at Rothamsted, we fed to sheep turnips raised by different manures. The turnips having a liberal—I may say an excessive top-dressing of ammoniacal salts, had a very fine leaf, and did not mature as early as the others. They were firm, handsome bulbs, and analysis shewed that they contained a much higher per-centage of nitrogen than the others. A chemist would have said that these were the most nutritious turnips. But the sheep told a different story. As far as I can recollect, every sheep lost weight, and it was evident the turnips did not contain the requisite nutritive matter. Now, I question if any analysis could have ascertained this fact. The *elements* were there, but they were not organized.

"'But,' it may be asked, 'are not albumen and other nitrogenous compounds organized, and when the chemists tell us how much of these compounds a grass contains, cannot we form an idea (so far as these compounds are concerned) of the nutritive value of the grass?'

"In answer to this, I may say, that the usual method of determining the amount of these compounds is simply to determine the total amount of nitrogen a plant contains, and then by *calculation* ascertain how much albuminous matter this amount of nitrogen would represent. So that when a chemist says a plant contains a certain amount of albuminous compounds, he simply means that it contains an amount of nitrogen equal to this amount of albumen. He does not know whether the nitrogen is organized or not. He finds the nitrogen there, but whether it is in a crude unorganized form that will not support animal life, or whether it is a highly elaborated compound, he does not ascertain. I do not say that he cannot ascertain this point, but so far as I know of this matter it has not yet been done in a satisfactory manner. Then, in regard to oil, there are good reasons for supposing that the so-called oil of succulent vegetables is a far less nutritive compound than the highly-elaborated oil found in flax seed, Indian corn, &c. And yet the chemist does not make the distinction. Whatever ether will dissolve, he calls oil, though in a crude, unorganized, succulent grass. This so-called oil is mixed with more or less waxy and colouring matter, which passes through the animal in an undigested form. In fact, I can readily conceive a poor, crude, innutritious grass containing more nitrogen, and more of this so-called oil, than a grass of the highest and best quality.

I do not say that an analysis cannot be made that would indicate, within certain limits, the nutritive value of different grasses, but it is certainly not an easy matter.

THE FLESH AND FATTENING OF STOCK.

IN no country within the temperate zones of the earth's surface does the diet of the people consist of so large a proportion of animal food as that of the people of Britain. It is not only in the large proportion of animal food of which their diet consists, but it is also in the lightness and simplicity with which such portion of their food is cooked; thus shewing the British people to be a more carnivorous race of mankind than most others at present in existence. Under-done roasted beef or lightly-broiled beefsteaks, and early-roasted mutton or under-done mutton-chops, being the most esteemed dishes of the *cuisine* of the British people. Such a predilection for animal food by the people of Britain has rendered the production of flesh meat as a branch of husbandry in the rural industry of Britain of equal importance to the growing of corn; and has, no doubt, been the cause of the domesticated animals forming the live stock of the farm being brought to greater excellence in the British islands than in any other part of the world. The superiority of the cattle and sheep of the British Islands over the same descriptions of animals of other countries is evinced by the perfect adaptation of the several varieties to the circumstances of the nature of climate, and the quality of the pasture of the locality in which each variety of either kind of stock may prevail, and in the unequalled—in any other country—aptitude of most of the British breeds of cattle and sheep of assimilating to their own substances the provender on which they are fed. Although the various breeds of cattle and sheep to be met with in the British islands may not possess the same precocity in their growth, and power of assimilating an equal quantity of flesh from the same quantity and quality of food, yet all or most of the varieties now cultivated for yielding animal food in different districts and localities in the United Kingdom possess some marked properties for their being worthy a preference under some specialty required to be met, and therefore the extinction of almost any of the breeds of British cattle or sheep now in existence would certainly be attended with a disadvantage to the nation.

The British feeders of stock have been charged with abuse of the excellence of the cattle and sheep on which they exercise their art on the feeding qualities of animals, by carrying the fattening to an excess far beyond the utmost limits of utility as food for man. This is, perhaps, rarely carried in reality to a censurable extent, except in animals exhibited at the shows of fat stock at the approach of Christmas, when animals are certainly sometimes to be met with in a state of fatness, which cannot but result in absolute waste. Not only from the waste in the cooking of the flesh of animals of the excessive fatness, as those competing for prizes in the show-yard, but their flesh being useless as food, from its excessive grossness, being positively revolting to the human appetite in the temperate climate of Britain. In order, however, fully to understand the last-mooted question, it will be necessary to describe the nature of the structure of the flesh of farm stock used as the animal portion of the diet of the British people, and to define correctly a standard of excellence in the quality of the different kinds of butcher meat by which to judge of its quality in a state of either excessive or deficient fatness as food for man. These topics will be the subjects of the next succeeding remarks, previous to a discussion of that which had been referred to just before them.

The edible portion of the flesh of the animals being the live stock of the farm, usually known as *butcher meat*, and forming the animal food of man, consists of two distinct and different substances—the lean and the fat. The first-mentioned of the substances is, in butcher's phraseology, called *lyer*, and forms the muscles, which in the living animals, by their inelasticity, and, at the same time, their power of contraction by the action of the nerves, is the means of motion and force in the organs and limbs of the animal's body; and, in the animal when dead, is that portion of its flesh which alone affords nutriment as the animal portion of the food of man, and as the aliment of all carnivorous animals. The other substance or fat, so far from in any way contributing either to its motion or its force, is an incumbrance to the living animal in retarding the velocity of its movements, and in diminishing the exertion of force; but it performs an important function in the economy of the animal organism in supplying the heat to the body required for animal existence; and the portion of the animal organism now under consideration is, when taken as food, only assimilated in its own form and condition and for the same purpose. [illegible] which it is dep[illegible] [illegible] Beside[illegible] [illegible] [illegible] [illegible] cartilage, &c.; but these being subordinate to the two principal components of flesh previously spoken of, and their having, moreover, no relation in particular to the subject under discussion, further reference to them will be omitted, and subsequent remarks herein will be confined to the principal components, the lean and fat of flesh.

The lean portion, or the muscles of animal flesh, is composed of bundles of the substance called animal *fibrin*, and each individual fibre is separated into several fine filaments called *fibrillæ*, which are held together by a sheath or casing of membrane, so delicate in its texture and transparent as to be imperceptible by the naked eye. The fibres contain a red juice, resembling in its colour that of claret wine, in which resides the nutritive property of meat, and imparts to the substance of the muscular portion of the meat the redness by which it is distinguished. The juice in question has so strong an affinity for cold water as to be entirely extracted from flesh, when cut into small pieces or minced, and steeped but for a short time, the juice of the flesh imparting its colour to the water, and leaving the fibres of the muscle quite white or colourless. Another property of the juice spoken of is its being coagulated by heat, and the extent of coagubility decreasing with the age of the animal from the time of its birth, when nearly the whole of the juice is rendered solid by heat, until attaining adult maturity, when further increase of coagubility ceases. It is from the last-mentioned property of its juice that flesh when cooked contains less gravy, is paler in colour, less sapid in flavour, and less easily digested as food, according to the length of period of the animal being short of its maturity of age.

The bundles of fibres of which each of the muscles is composed and the muscles, one with another, are connected, and the muscular system of the flesh of the animal, is covered nearly throughout the surface of its body with membrane formed into cells, and which is called cellular tissue. This, when well developed in an animal in its lean state, is an unerring indication of its propensity to lay on fat. The desirable indication spoken of is the resilience of the hide, or skin, when raised up and pinched by the finger and thumb, y the hide, or skin, floating upon a ıg substance beneath it when gently d by the palm of the hand. The cel- :issue, as has before been remarked, nearly the whole of the muscular ı of the animal, and such covering lies liately between the muscles and. the or skin, except on the sides, and ıching therefrom on the posterior part shoulder and on the belly a thin layer ıscle is interposed between the fat ng the muscular system of the body ıe hide, or skin. The last-mentioned taneous muscles, or, as called by rs, the *fell*, will have to be again d to in a subsequent remark.

cells of the cellular tissue, described gradually become filled with fat during ogress of the fattening of an animal. uld be remarked that animal fat is com- of two components—viz., fluid oil, or and that which imparts a solid con- :e to fat, and called *stearine;* and it is evailing of the one or the other of these nents to an undue extent by which a different character is imparted to the of fat. Thus, if *elaine* be in excess, will be of a greasy character, and when *e* prevails to an undue extent, the fat dry and friable. Either of the pro- mentioned, if to an undue extent in , will produce an objectionable quality t.

s frequently the case that the fat of sh of cattle exhibited at the shows stock on the approach of Christmas, is ly greatly in excess of a desirable pro- n in its quantity to that of the lean of at, but it is also in a semi-fluid state at mperature of the atmosphere short of frost. Such an objectionable state of meat is for the most part the result of the nature of the food on which the animal yielding it has been fed ; and such may also be, as it sometimes is, the effect of a constitutional peculiarity of an individual animal, or that of a property common to a particular variety or breed, or even of a particular tribe or family of a variety. As to the latter-mentioned cases, it will be found that the flesh of cows, of any variety of breed, having yielded milk of extraordinary richness in butter, and also that of the cattle of the variety of breed prevailing in the Channel Islands, the milk from the cows of which being of a most extraordinary butter-yielding quality, when fed to a high state of fatness, is very generally of the undesirable quality pointed out. As to the objectionable quality of flesh referred to being the effect of the nature of the food on which animals have been fed, the excessive oiliness of the fat may generally be traced to the use of too great a quantity of feeding material containing either oil already formed, or the elements capable of producing oil in the assimilation of the feeding-stuff to the flesh of the animal fed on it. Of the various materials now in use as artificial or extraneous feeding-stuffs, none is so commonly the cause of the effect referred to, from a base of its application in excessive quantity in preparing animals for exhibition at the Christmas shows of fat cattle, as linseed oilcake, which, when used in the inordinate quantity it frequently is on the occasions referred to, imparts the most disgusting grossness and oiliness to the flesh of animals that have been fed on it. The friable dryness of fat previously alluded to is probably the effect of a constitutional tendency, rather than the nature of the food on which the animal yielding such fat may have been fed.

PERMANENT PASTURE GRASSES.

No. VI.—FESTUCA RUBRA *—(*Linnæus*)—Red or Creeping-Rooted Fesc

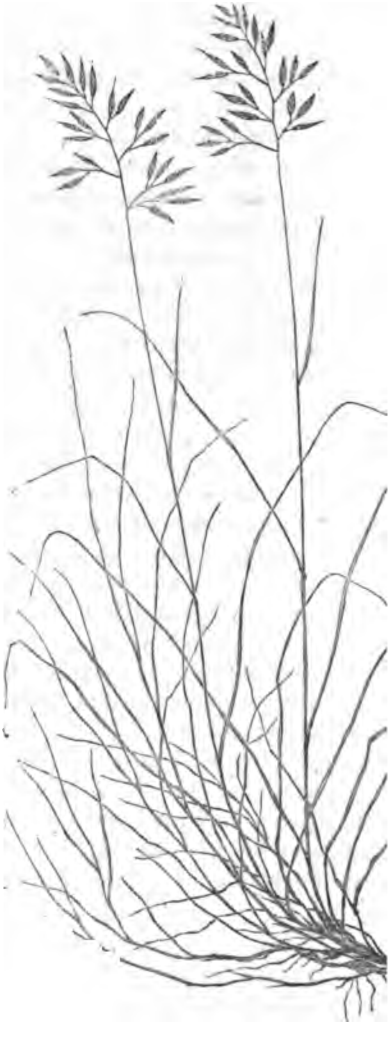
SYNONYMS.—*Festuca duriuscula rubra* of Parnell; *F. ovina rubra* of Lowe.

ROOT perennial, and extensively creeping; leaves of the barren or root-shoots long, slender or drooping, narrow, varying from involute to flattened, and with reddish purple sheaths; those of the stem more broadly flattened, and all of a darkish green colour; stem four-or five-jointed, upright, or somewhat bending, smooth, slightly fluted, from 2 to 2½ feet long, and more or less purplish in colour, particularly about the joints and most exposed parts; panicles usually bending or drooping, more especially after flowering, their branches mostly spread horizontally to one side; spikelets set each in an unequally bi-valved calyx, and usually about six-seeded; seeds shortly awned, the awn arising from the point of the outer and largest palea, or adhesive scale. Usually in flower about the middle of June, and ripening its seeds in three to four weeks thereafter. Although the extreme or typical forms of F. rubra and F. duriuscula are sufficiently distinct, yet they are so united by intermediate forms or varieties that some botanists deem it impossible to draw a line of distinction between them; and they accordingly get rid of this scientific difficulty by including all under F. duriuscula. We prefer, however, adhering to the good agricultural distinction, inaugurated by Linnæus, of referring the merely fibrous or slightly creeping-rooted forms [illegible] uscula, as at p. 301, and those [illegible] lly spreading root [illegible]

[illegible]

[illegible] ound

above altitudes of about 1500 feet, most prevalent under half that he



Festuca rubra.—Reduced in size, shewing habit

especially so in the vicinity of the presence being indicative of dry soil soil, as well as of good sound pastu

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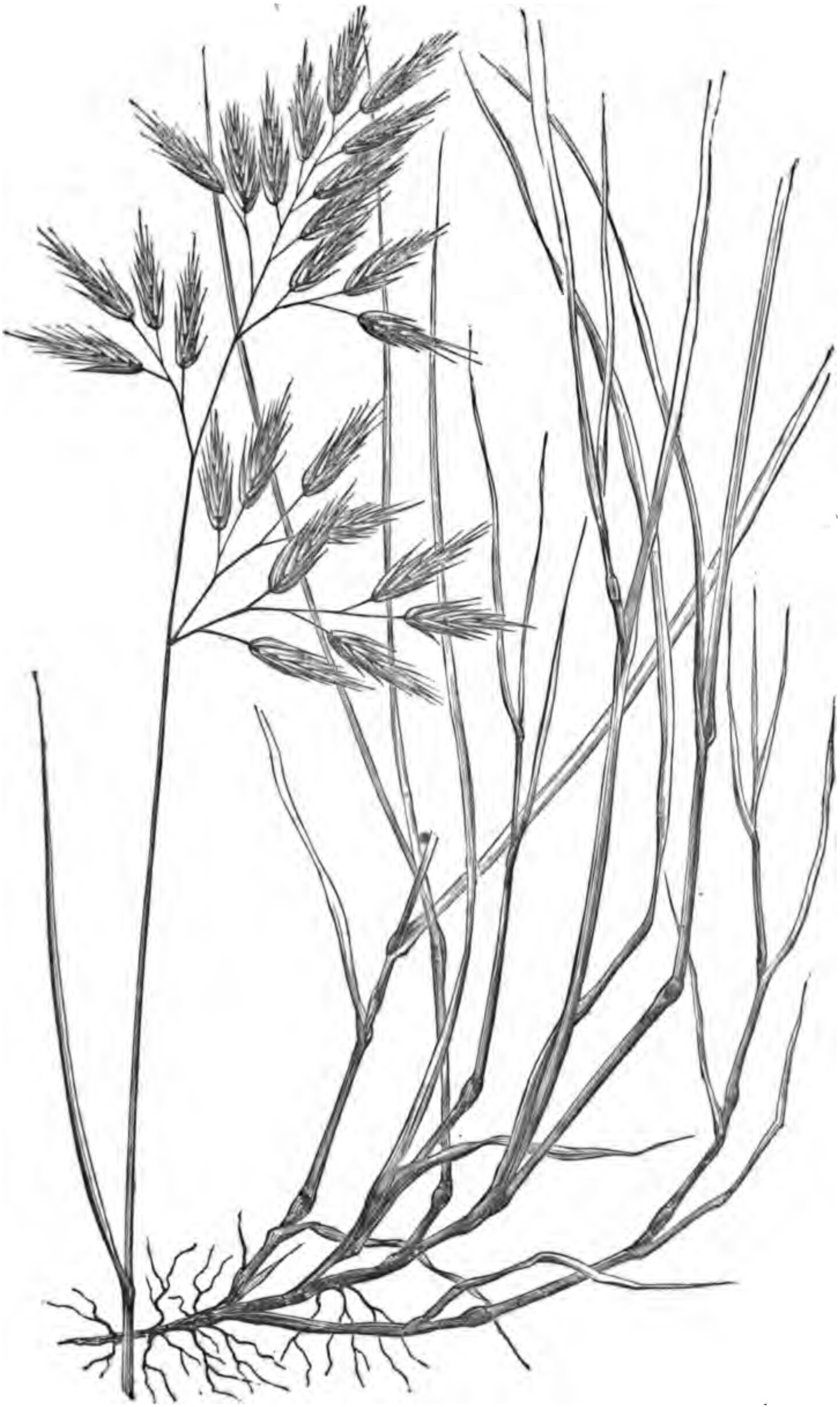
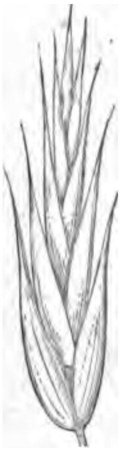
[illegible] Latin *rubra*, [illegible] in allusion to the reddish colour of the lower portion of the stems, leaf-sheaths, and joints.

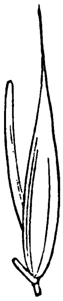


Festuca rubra--Natural Size.

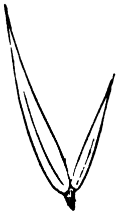
is frequent in all countries of continental Europe, as well as in those of north-western Asia, but we have no evidence of its being so widely distributed elsewhere as the F. duriuscula.



Spikelet magnified.



Floret magnified.



Calyx magnified.

QUALITIES AND USES.

Dr James Anderson of Monkshill, Aberdeenshire, author of "Essays relating to Agriculture and Rural Affairs," published in 1784, seems to have been the first who recommended this grass for cultivation; but while portions of his description undoubtedly refers to it, others are more strictly applicable to some of the forms of the less creeping-rooted F. duriuscula; and it is highly probable that the small handful of seed which formed the basis of his experiment was collected from plants of both indiscriminately. The F. rubra yields a full average bulk of herbage, and its thickly matted, widely spreading, deep penetrating roots, enable [illegible] to maintain an appearance of freshness [illegible] light soils throughout severe drought [illegible] other grasses are [illegible] foliage then succumb, [illegible] on the recurrence of [illegible] useful in permanent [illegible] dry, sandy, or gravelly [illegible] tenacity of life unfits it for alternate husbandry, forming, as it does, when ploughed up, the most unconquerable description of turfy clods or "muir divots," when grown upon what may be termed good strong corn land. It has the further objection of liability to suffer from mildew in moist localities; and under any circumstances its verdure is of a too dark or dull green colour to recommend it in preference to the better varieties of F. duriuscula, wherever these last can be got to thrive. Grown in the Woburn Grass Garden, its produce at the time of flowering was at the rate of 10,209 lb. of grass per acre, the weight of which, after drying, was about 4339 lb.; while at the time of seed ripening these products were respectively 10,890 lb. and 4900 lb.; and the produce of the latter-math was equivalent to 3403 lb. per acre. In the first and second year of its growth from seed the produce was greater than that here quoted, and afterwards it declined till the eighth year, when it became so thin and diminutive as hardly to amount to one-sixth of the above; but though its creeping roots thus impoverished the soil for its own maintenance, yet the ordinary kinds of fibrous-rooted grasses succeeded well on the ground so impoverished.

SEED AND SOWING.

The seeds are usually darker in colour and a little longer awned than those in most samples of F. duriuscula, p. 301, but in other respects they are very similar; 10 lb. per bushel being their average weight, and about 39,000 of them are contained in a single ounce. The greatest number braird when covered with not more than a ¼ of an inch of soil; only half that quantity when covered by ¾ of an inch; and none come up when covered to a depth of 2¼ inches. The soil should, therefore, be well pulverised before sowing, and a rolling, or very light harrowing will suffice for covering them in. Two bushels, or 20 lb., will suffice for sowing an acre without any additional mixture; but associated with the seeds of other drought-resisting grasses, about ½ a bushel may be employed.

CHEMICAL ANALYSIS.

We have not met with any reliable recent analysis of the grass of the true F. rubra, but it may be assumed to differ little, if at all, from that of the F. duriuscula. By the Woburn experiments, however, the nutritious matter in its creeping roots was found to consist almost entirely of mucilage; while that in the fibrous roots of the latter and some of its varieties, consisted chiefly of saccharine and bitter extractive matters.

VARIETIES.

The following comprise the most important forms of what may be termed the creeping-rooted hard fescues, or varieties of F. rubra:—

1. *Festuca rubra angustifolia*, or narrow-leaved creeping fescue.—This and its associate, No. 5, are the most generally distributed varieties of the red or creeping fescue. It is distinguished from the latter by its dwarfer and more slender growth, as well as its shorter, more involute, rigid, or wiry leaves, which characteristics are, however, materially modified or changed by cultivation, soil, and the age of the plants.

2. *F. r. arenaria*, sand creeping fescue.—A very common variety on sandy sea coasts, distinguished by its dwarf, rigid, and upright growth; it averages about a foot in height, but is frequently under 6 inches. Its panicles are erect, horizontally branched, and composed of comparatively few but remarkably large seeded spikelets. In moist weather it ripens its seeds about the middle of July, and then becomes withered or dried; but when early drought sets in the whole plant assumes that appearance before the seeds are matured. This is the F. arenaria of some authors, and may be deemed the most worthless of its tribe.

3. *F. r. Cambrica*, Welsh or light green creeping fescue.—Notwithstanding its name, this is a very common grass throughout Britain on dry soils of light or medium texture, and in upland arable fields, where two or three years' pasture grass forms part of the rotation, it is the best of those grasses of which the "muir turfs" are composed, and generally adds more to the value of the stubble pasturage than compensates for any injury that the corn crops sustain by its presence. It differs materially from the typical form of F. rubra in being always of a paler yellowish green colour; it is also shorter, and more rigid leaved, and produces fewer, more upright, and smaller panicled flowering stems. This is the best of the creeping-rooted fescues for short grass, and is admirably adapted for such on play-grounds that are much frequented. The Woburn experiments proved this to be much inferior to both F. duriuscula and F. rubra in the bulk of its early crop; and although it approached them in the growth of its root-foliage, after seed ripening, it possesses no agricultural properties entitling it to cultivation.

4. *F. r. hirsuta*, downy panicled creeping fescue.—This has been named F. areneria, from being found naturally on sea-shores among partly consolidated sands, along with the sand reed and the sand lyme grass. It is fully as robust in growth as the next, and also longer and finer leaved. Although this variety has not yet been regularly cultivated, it certainly deserves to be so by all who have to do with the consolidating of blowing sea-sands, as it is one of the most bulky of highly-nutritious grasses that such soils are capable of supporting.

5. *F. r. latifolia*, the broad-leaved creeping fescue.—Differs from No. 1 in its stronger growth, but more especially in the greater length as well as width of its foliage, many of the leaves being more or less flattened, and comparatively few of them involute or wire-like. In selecting plants to seed from for agricultural purposes, the best belonging to this variety should be chosen.

7. *F. r. Uri*, the Uranian long-leaved fescue.—That eminent experimentalist, the late Mr T. Bishop of Methven, was attracted by the verdant healthy appearance presented by this grass, in the Glasgow Botanic Gardens, during the excessive drought of 1826, when most of the others in that collection were withered, or at least stopped in their growth. He was informed that it had been originally received from the Canton Uri, in Switzerland—Urania of the Latins—and having obtained a plant of it, he propagated it rapidly and to a considerable extent. Compared with the last, it has much longer and more involute root leaves,

these often exceeding 3 feet in length, and being generally longer than the flower stems, which are more sparingly produced than those of either Nos. 1 or 5. The whole plant is also of a lighter green colour than these, though less so than No. 3, and its roots are somewhat less creeping. This is decidedly most valuable, as well as generally usel variety of F. rubra; and in consequence its property of withstanding extreme drough it was specially recommended by its origi tor to the attention of Australian colonists.

ON THE OWNERSHIP AND OCCUPATION OF LAND IN ENGLAND.

A SECT of philosophers now exists in the world who appear to regard the class of landowners who do not cultivate their possessions, but live upon the rents paid them by the actual cultivators, with intense dislike, and as a sort of blot and excrescence on the social system, the removal of which would greatly improve the condition of the body politic.

The object of the following paper will be to examine whether or no the accusations against landowners, especially in England, are well-founded, or whether we ought not rather to look upon these as a class of persons who naturally arise at a particular period in the economical development of a country, and whose existence greatly conduces to the prosperity of its agriculture, so important an element in its material progress.

If there is any part of the science of political economy better understood than another it is the theory of rent. As respects it, no material difference of opinion has existed for many years. Let us take the definition of Professor Fawcett, which well expresses the received doctrine. He tells us "that the rent of land represents the pecuniary value of the advantage which such land possesses over the worst land in cultivation, which of course pays only a nominal rent." We may add the remark that when successive doses of capital are laid out upon the same land, rent arises from all but the last. The existence of rent then is a natural incident, which cannot be prevented and ought not to be deplored.

In the case of the man who occupies his own land, the rent remains with the actual cultivator, and forms an addition to his remuneration for an outlay of labour and capital. In some cases the actual cultivator pays his rent in labour either wholly or chiefly. This was the state of things in all feudal countries, and existed n England until the time of the Tudor sovereigns, when the landowners preferred money to corporal service, turned small arable holdings into large pastoral occupations, and broke up what may be called the cottier system.

There never existed in England a system of peasant proprietorship at all analogous to those to be found on the Continent, especially in countries conquered and governed by the Romans, and always subject more less to Roman law.

The form of rent differs greatly in different circu stances and in different countries. That which exi in Great Britain, where the landowner as a rule fi nishes, besides the land itself, the capital fixed in buil ings, &c., the tenants simply paying a money rent forth use, is also common on the Continent; but in Franc Spain, and Italy, what is called the métayer system more common. There, usually, the owner furnish the land, buildings, and a portion of the floating ca tal, receiving in return a portion—usually half—of t gross produce in kind.

In all old countries where land of varying qualiti is taken into cultivation, the best land must yield rent, and its produce must be regarded as divided in wages of labour, profits of capital, and rent, whi severally fall to the labourer, the farmer, and t owner, although it may often happen that the sa person appears in two, or even in all these capacitie There is, however, a fourth person who is little r garded by many economists, but who, neverthele occupies an important position in the organization agriculture. This person is the mortgagee. He to be found wherever land can furnish a valid securi for a loan; and in countries where the custom of hiri the land of another is unpopular, or little underst and practised, he becomes to a great extent the re pient of the rent.

Thus, in the United States, instead of letting land, the proprietor sells it out and out, receiving, will suppose, 10 per cent. money down, and the mainder of his claim in nine annual instalments w interest, retaining his hold upon the land as security, until the debt is fully discharged. In t case he really receives rent in the shape of interest capital. The same thing exists in Norway. Land rarely, if ever, sold in that country for ready mon and the proportion of landed property mortgaged very large.

Let us now consider what form of the occupatio land is, on the whole, most advantageous. answer must surely be that which produces the lar return—that in which the inherent qualities of ı the help of a sufficient and skilful applica- apital and labour, are made to produce the quantity and value. Now, example is better ory, and we find that Great Britain, with soil ıate far inferior to that of France, perhaps the lvanced of continental countries, produces a return both in value and quantity—that, in is the best cultivated country in Europe.

nt proprietors are very industrious and very but they have seldom sufficient capital, and if d it they can seldom apply it skilfully and at pitious time. Their animals and implements ally of bad quality, and if they are to have of them during a busy time of the year, they 'ten be puzzled to find employment for them the rest of the twelve months. Yet in Belgium, , and Switzerland, districts may no doubt be where the result of peasant ownership is favour- The example of Flanders, so often cited in its possesses but little value, as a large portion of ltivators there are tenant-farmers holding on eases, and at rack rents.

ı the métayer system, perhaps the worst of all, lving almost necessarily the application of in- nt capital, much fraud, and interminable dis- and as yielding in general a very poor return, is consistent with skilful cultivation under fa- circumstances, as may be seen in Tuscany, in of the Roman States, and doubtless in other ies.

omplete separation between the ownership and ıtion of land can hardly take place until there en a large accumulation of capital, giving rise existence of a class of persons willing to employ noney in a species of property yielding a very te of interest, provided it be accompanied with : security and some social advantages, and this f things can hardly exist but in an old country. In ited States, and in our colonies, nobody probably be willing to make an investment which would s than 5 or 6 per cent. People in these countries, lly speaking, buy land to sell again, but not view of letting it.

will now explain why it is that the occupation l by farmers instead of owners is on the whole the advantageous. The occupier is in the most able position, other things being equal, when devote the largest amount of capital and in- nce to the actual cultivation of the soil. This is se with the man who farms the land of another English system. He ought to be regarded as ower of the land or its value, at a rate of interest ly less than 3 per cent.

us take the case of a farm of 200 acres, with a f say 30s. an acre. This represents a sum of 00, which, did the land belong to the occu- ıe must find from his own means or borrow at a f certainly not less than 4 per cent.—probably —with the risk of being called upon for repay- at the most inconvenient moment.

Suppose the land to be his own and unmortgaged and that he possesses besides £2000 of active capital, how will his income stand?—

Rent	£300
Profit on active capital, and pay for personal service, say 15 per cent.	300
Total, 5 per cent, on £12,000	£600

Suppose him to possess £12,000, but that he hires the land of another—

Profit on active capital as before	£300
Return from £10,000 vested in cottage property, or on mortgage, or in railroad bonds, &c., at least 2 per cent.	500
Total income	£800

Or one-third more than in the former case, with less risk.

What precedes, however, gives a very imperfect notion of the relative advantages possessed by the farmer over the small freehold occupier.

Let us suppose that a man worth £5000 resolves to purchase land and cultivate it himself, and that he lays out £1500 in one capacity and retains £500 in the other. How will his income stand?—

Rent	£45
Profits on active capital	50
Personal service	50
Total income	£145

—little more than that of a mechanic.

In all probability within a few years he will become embarrassed and borrow, or he will be tempted or necessitated to sell his land, and, at any rate, he will occupy a lower position and more restricted income than if he had employed his capital in cultivating the land of another. The preceding examples, however, although useful as illustrations, give but an imperfect notion of the loss of income or of profit which arises from the employment of money in England in the purchase rather than in the hiring of land. This may be put down at 7 per cent., the difference between 10 per cent. and 3 per cent. per annum.

So long, then, as a class of persons is to be found who will hold or purchase land paying only 3 per cent., it will be the interest of the actual cultivator to hire rather than to buy land. The cultivation of land, in small quantities especially, by its owners bears a close analogy to the process of domestic manufacture once almost universal, which has generally yielded to the factory system.

It is impossible that a small capitalist could ever find his interest in purchasing land for cultivation in England, unless the price of land should fall from thirty years' purchase to fifteen, or at least to twenty. In other words, to from two-thirds to half its present price.

It is often said that the reason why land in E land is so seldom occupied by the owners for the p pose of cultivation is to be found in what are called the land laws, which are said to keep land out of the market and confine its ownership to a few persons.

The power of entailing and making settlements produces, doubtless, some effects in this way, although at present entails and settlements almost always contain ample powers of sale and exchange. At any rate, there is always plenty of land in England inviting purchasers both of large and small quantities, and that in every county. In the district best known to the writer, most of the land has been sold more than once in his lifetime.

Besides, it is not found that land is exceptionally dear in England, but rather the reverse. In France, Holland, Belgium, in the best governed and most wealthy parts of the Continent, it is said to be worth more than thirty years' purchase, which may be considered the normal rate here. Indeed, with reference to the price of the funds which do not pay more than 3¼ per cent., it may be considered that land in England is relatively very cheap.

It would not be difficult to explain why it is that land is relatively dear on the Continent, when compared with its price in England. We may, however, point at the fear of revolutions, an absence of poor laws in Catholic countries, old habits, and the influence of laws derived mainly from those of Rome, as the most efficient causes of the phenomenon.

It is probable that if ever a change of circumstances should occur on the Continent, we shall find the number of small freehold occupations diminish, and t farming of land become gradually more common th at present.

There are doubtless many social and political a vantages connected with peasant proprietorship t which the writer is not insensible. He would wi to see these advantages realized in England, but this there appears no chance.

It may be safely asserted that the ownership of lan in England is really natural, and arranged upon fre trade principles. It has assumed the conditions unde which the land itself and the capital and labou bestowed upon it are most advantageously employe as respects the return derived from them.

Supposing that either by means of direct confiscation or some less violent measure the land in thi country should be placed in the hands of a multiplicit of owners, and supposing, what is difficult to imagine that a sense of security should ever be restored, w should find a gradual return to the present state o things, in which the ownership and occupation of th soil are usually dissevered.

In conclusion, a few words may be said in defenc of that much abused class—the landowners. The are neither much better nor much worse than othe people. Like them, they follow what they conside their own interests, but living as they do in glas houses peculiarly open to attack, they can hardly b exceptionally bad, and they certainly bear their ful share of public burdens.—*London Economist.*

THE MARQUIS OF TWEEDDALE AND STEAM PLOUGHING.

AT a recent meeting of the Highland and Agricultural Society of Scotland, the Marquis of Tweeddale delivered a very interesting address on the comparative advantages and cost of steam and horse-power to hand labour. The following is a revised report of the speech delivered by the Noble Marquis :—

"At a meeting of the Directors of the Highland and Agricultural Society, held on 3d March 1869, it was esolved, on the suggestion of the Special Committee on Steam Cultivation, that before that Committee hould give in their Report, a discussion should take place on the comparative advantages and cost of steam and horse-power or hand labour : 1. With erence to the working of land in a high state of ultivation; and 2. With reference to improvable land. And I have to express the wish of the Directors, that gentlemen who take an interest in this important subect will address the meeting, and give us the benefit of their knowledge and experience. I have been asked to make some observations on the advantage to be gained by the deeper cultivation of the soil, and to state my experience of the different methods of deep ploughing I have tried on the farms in my own occupation. The operations of deep ploughing at Yeste have already been so fully described by Mr Stephen in his book, intitled "Yester Deep Land Culture,' published in 1855, that I think it unnecessary to dc more than to refer to them generally.

I have in my own hands upwards of 1700 acres o land, consisting of the farm of Yestermains, Broadwoodside, Danskine, and Newhall, situated in th upper district of East-Lothian, and from 350 to 70 feet above sea level. The land, before it was draine and improved, consisted principally of a naturally poo soil of a moorish nature, resting on a subsoil of sand clay, containing moorland pan in considerable quantit impervious to water, the surface soil seldom exceedin 5 to 8 inches in depth (in many cases less), and in i natural condition not suitable for growing turnip The first operation was to tile-drain the land thoroughl On Yestermains and Broadwoodside this was do between twenty and thirty years ago. During t drainage operations, I was led to observe that althou the water was in a great measure removed from t soil, yet the drainage would not be perfect until t subsoil between the drains was broken up so as to allow the water to reach the drains more rapidly and the air to circulate in the soil; and as I had been in the habit of spreading the bottom soil of the drains across the surface of the ridges, and had observed the great change which took place in the subsoil from its exposure to sun and air, I commenced about twenty years ago to plough and subsoil the land to a depth of 20 inches, the operations being performed by a plough drawn by four horses, taking a furrow 15 inches deep, which was followed by a subsoil plough with four horses, breaking up an additional depth of 5 inches. I found that the plough in common use in East-Lothian, from its mould-board being concave, was not adapted for deep ploughing, as it could not, without great exertion on the part of the ploughman, be kept deep enough in the soil; and also that it inverted the furrow slice, so that the whole subsoil was brought to the surface.

The implements used by me in deep ploughing were of my own contrivance, the mould-board of the plough being convex, and so constructed as not to invert the furrow slice, as in ordinary ploughing, but merely to turn it on its side or edge, and to break it as much as possible; in this way a comparatively small portion of the subsoil is brought to the surface, and yet a thorough mixing of the soil and subsoil is effected. The deep ploughing was first commenced with the stubble furrow, but afterwards in ploughing lea, in order to give the horses a firmer hold of the ground with their feet. The action of the subsoil plough is merely to stir the subsoil in the bottom of the furrow, and in doing so, a little of the surface soil gets mixed with it and assists to keep it open. The cost of this ploughing, as stated by Mr Stephens, is £2, 13s. per imperial acre, which includes 5s. per acre for removing stones.

I carried out this deep stirring of the soil in one rotation for five years, without regard to the expense of it, as I was desirous to set at rest the question as to whether such an operation was beneficial or lasting in its effects. I tried teams of oxen of the best description yoked in the plough, but I found they were too slow, and the shape of their feet unfits them for walking on the pulverised soil. They soon tired and could not work. I also tried steam-power, consisting of two engines of 14-horse power, one on each head-land dragging the plough backward and forward between them; but the quantity of set-fast stones and other obstacles with which the plough came in contact in the land subjected the machinery to constant injury, and the expense and delay caused by the repair of these breakages were very great, and could not be avoided, as any contrivance to disengage the power of steam from the machinery when it met an obstacle, that was then known, had proved a failure. With horses I had no difficulty, as they instinctively stopped when the plough met with an obstacle; and as I would not allow the ploughman to urge the horses to exert themselves, there were few or no breakages.

I have now had twenty years' experience of the effects of this deep ploughing. I was told at the time I was engaged in that operation that I was destroying the land by mixing too much of the subsoil with the surface soil, that in a year or two the subsoil would return to its natural state. Any one who knew the state of my farms before I commenced these operations, and who now sees the excellent crops of turnips, grain, and grass grown on them, and the comparatively early period of the year in which the grain ripens, and the cattle and sheep go into the fat market with what they did formerly, will bear witness to the great improvement that has been effected; and instead of the subsoil which had been stirrred running together again, it has been found to have changed its colour and character altogether, and to resemble very much the surface soil. So much is this the case that the stubble furrow can now be ploughed from 12 to 13 inches deep with two horses, and it has not been found necessary to repeat the operation of subsoiling.

In the course of these operations of deep-ploughing and subsoiling, considerable numbers of stones were found in the land, and some of them boulders of large size. These had all to be removed by hand labour at a cost of 5s. or 6s. an acre. They have been used for buildings, and in improving the roads on the farms.

Having been frequently told that the operation of deep ploughing and subsoiling, costing £2, 13s. an acre, was beyond what a tenant of a farm would probably undertake, and that it should be done at the landlord's expense, I have, during the last five years, been making experiments on deep ploughing in a modified form on the farm of Newhall, which came into my possession recently, and has since been thoroughly tile-drained. It had never been ploughed more than 7 or 8 inches deep. I have, with three horses yoked abreast in the plough, ploughed this farm from 12 to 14 inches deep, and have dispensed with the subsoiling. This has been done without increasing the working strength on the farm or interfering with the regular work of rotation; and as the cost, as I shall afterwards shew you, is £1, 2s. 3½d. per acre, including the expense of removing stones, I am satisfied that objections on the score of expense will not be made to it.

In March 1868 I took a field of about 25 imperial acres into my own hand. This field had never been previously ploughed more than 7 or 8 inches deep. It had been tile-drained during the previous winter. I was desirous to have this field ploughed on my modified plan from 12 to 14 inches deep, and as it seemed to me to be a suitable field for the trial of a steam-driven implement, and as steam cultivation had not taken hold in Scotland as in England, I desired to satisfy farmers by giving them proof of the working of steam and horse-power, so that they might judge of their comparative value. I therefore invited the owners of steam-ploughs to send their tackle to the field, stating that I would send my horses and ploughs to work alongside of them, so that a comparison could be made between the work done by horses and steam-power. My invitation was not accepted, so I ploughed the field with my horses, having previously asked a number of well known agriculturists to examine the work while in progress, and to state their opinion thereon. I shewed these gentlemen the working of a four-horse plough, a three-horse plough, and a two-horse plough. They drew up a report on the work they had seen, which appeared in the newspapers at the time, but I would like to read you some extracts from it. They say—"We found in operation on the field one plough with four horses, six ploughs with three horses, and five ploughs with two horses yoked to them. The four-horse plough turned a furrow 14 inches deep and 14 inches wide; the horses were yoked two abreast, the leading pair by a soam chain to the bridle of the plough. The 3-horse plough turned a furrow 13 inches deep by 13 inches wide; the horses were yoked abreast, two going on the land and one in the furrow. The 2-horse plough turned a furrow 12 inches deep by 12 inches wide. We did not test the draught of the various ploughs, but the horses were working freely and easily in all of them, and did not seem oppressed with the work in any way. We observed this particularly in the 3-horse plough, and recommended the Marquis to yoke three horses to each of the 'Yester' ploughs, as in our opinion the most economical application of the horse-power for the depth of furrow. His lordship concurred with us, and three horses were accordingly yoked in each of the ploughs. The measurements of the depth of furrow are made upon the solid unturned soil. The land contained some boulder stones, which were removed by labourers following the ploughs. None of the stones were very large, nor were they in greater quantity than is usually found in the soil in this district. An exact account of the time occupied in ploughing the field of 25 imperial acres has been kept by Lord Tweeddale's overseer, and it is equivalent to fifty-four days of a pair of horses working eight hours a day. Lord Tweeddale calculated that the actual cost of a pair of horses, including the ploughman's wages, is 1s. per hour; the expense of ploughing an imperial acre 13 inches deep is, therefore, 17s. 3½d. We have to record our entire satisfaction with the work done, and of the great improvement effected by this deep stirring of the soil. The ploughs are exceedingly well adapted for the purpose, their peculiar construction allowing a deep furrow to be turned without [illegible] great a qua[illegible] subsoil to the surface.

[illegible] necessary to do it, and at [illegible] that three horses yoked [illegible] applying their power. [illegible] observe the effects of [illegible] ploughing on Newhall [illegible] t will answer the end in [illegible] was completely worked out when [illegible] hand; as an example of this, the out-going tenant had a 14-acre field of grass during the last year of his possession, and he put a mare and a foal to graze on it. No other animals were put in and before the season was over, owing to tl of grass, he had to remove them to another f field was drained, and then ploughed from inches deep; and with an application of g dissolved bones, of the value of £2, 13s. 6d. grew an excellent crop of turnips; and last y in young grass, carried four sheep per acre fo of the season. I have left a field of Newh state in which I got the farm, so that any or it may judge for himself of the effects of tivation.

From the remarks which I have now ma be seen that the cost of breaking up, ploug subsoiling land to the depth of 20 inches is perial acre, £2, 8s., and for removing stone all, £2, 13s.; and for breaking up and plou the first time) 13 inches deep, the cost pe acre is 17s. 3½d., and for removing stones, 5 £1, 2s. 3½d.

The question then comes to be whether th tions could have been more economically e steam than by horse-power. The presence stones in the soil is, in my opinion, an i bar to the use of steam-power for breaking-u ploughing for the first time land such as I describing. In my opinion it is essentially that all obstructions be removed from the it can be properly and economically plo steam-power; and a re-arrangement of the many farms will also be required. After th been deep ploughed and the stones remo have described, my practice has been to p stubble not less than from 12 to 14 inches d sured on the solid, and which is equivaler 16 to 18 inches on the turned land) once in tion, in preparation for the turnip crop. the practice was to plough the stubble i from 7 to 8 inches deep, and in spring plough it about the same depth, and it required one or two furrows, besides the harrowings and rollings, before a suffici could be got for sowing the turnips. My of the deep ploughing is, that when the lan narily clean no further ploughing is nece that is required in spring being a turn of t harrow to level the surface, and a double t common harrows to bring to the surface before making up the turnip drills. The se for the grain crops are not ploughed dee necessary to cover the seed.

The increased depth of soil now in cultivat the roots of the wheat and clover to get a fi the ground beyond the reach of frost, an not thrown out of the ground in spring, as formerly. Whether this subsequent deep could be done cheaper by steam-power thar I am unable to say; but I hope the commi the information they have collected and n ceive, will be able to settle this point. I

ıt my experience leads me to believe that
rer means *speed*, and that the more rapid
ı of the land can only be effected when it is
r pulverized for that purpose. I have had
.t kept of the time occupied by a pair of
ploughing an imperial acre 12 by 14 inches
ch had been previously deep ploughed and
removed, and I find it to be twelve hours,
ost 12s. per acre. I prefer yoking three
:he plough, as I find it easier for the horses,
:he work is better done, although it costs
n acre. I will now give you my calculation
: of keeping a pair of horses for one year :—

ges, &c.				£40	0	0
uarters, at 25s.				38	15	0
.xteen weeks, at one stone each er day—14 stones per week, at stone of 22 lb.				11	4	0
twenty-eight weeks, at 1 stone orse per day—14 stones per ıt 4d. per stone of 22 lb. ...				6	10	8
litter compensated by manure				0	0	0
tares for eight weeks, at 1s. 6d. for two horses				4	4	0
.h				4	5	0
... ...				1	10	0
... ...				1	5	0
air of horses ...	£90	0	0			
ion in value, 7 per	£6	6	0			
f capital, 4 per cent.	3	12	0			
				9	18	0
nplements, harness, ır a pair of horses	£60	0	0			
ion in value, 6 t.	£3	12	0			
f capital, 4 per cent.	2	8	0			
				6	0	0
including veterinary surgeon, ıe, bran for mashes, &c. ...				1	8	4
				£125	0	0

s work, on an average, 277 days in the year,
verage length of the day is nine hours; the
efore, cost me within a small fraction of 9s.
ng day, or 1s. per hour. I have been told
leep ploughing would soon deteriorate my
ım over-exertion, and predispose them to dis-
ıis I have not found to be the case, or that
: injured by the work in any way. If the
: properly yoked and driven by a ploughman
:rstands his work, and if the number in the
; regulated by the nature of the soil to be
, the work is little, if at all, more severe than
ploughing.
endeavoured to bring under your notice the
hich induced me to undertake the different operations which I have described on farms which have been cultivated under my own direction. The means employed in carrying them out have been given in detail, as well as the success which has attended the system I have followed. I trust that they may prove worthy of imitation by my neighbours on such soil and climate as they may think adapted for the undertaking, and that the fruit arising from their industry may tend to increase the produce of the land, and equally benefit the cultivator and the consumer."

An interesting discussion took place after the Marquis had concluded his address, from which we select the two following speeches, as worthy of being reported in full, viz., those of Mr George Hope, of Fenton Barns, and Mr George Greig, Harvieston, the agent in Scotland of Messrs John Fowler & Co. :—

Mr GEORGE HOPE (Fenton Barns) said :—I have no intention of discussing, except in an incidental way, the comparative advantages and cost of steam and horse power with reference to the working of land; and still less of comparing the merits of the various systems of steam cultivation now in use. I simply wish to state to you, as clearly and briefly as I can, my own practical experience in steam cultivation, and will leave you to draw your own inferences from the facts that I propose to lay before you. In September 1863, I obtained from the Messrs Howard of Bedford, a set of their steam cultivating apparatus, a cultivator and a harrow, and a 10-horse power engine, made by Clayton and Shuttleworth of Lincoln. I can honestly say I have had no reason to regret making that purchase, though I have lately changed Howards' cultivator for Fowler's grubber, and have also added to my stock a Fowler's four-share balance plough. Messrs Howards' cultivator stirred even stubble land most efficiently, and suffered nothing from coming in contact with stones, so that I never had to complain of breakages; while the quantity of land-fast stones that I have had to remove is immense. I may mention that from one single field the stones, when broken for the road, have measured about 200 cubic yards. However, Fowler's grubber covers more ground, and consequently does more work without being heavier in draught than Howards', but it is only suitable for land that has been previously ploughed or stirred. Again, from the wheels of Fowler's being much larger and broader than Howards', and as they only run on the unworked soil, the depth is more easily regulated, and no wheel-marks are left on the stirred earth. On land that has been ploughed to the depth of 10 inches, Fowler's grubber can easily be made to stir it from 2 to 3 inches deeper without any undue strain on the engine or rope, while Howards', at that depth, had, on some soils, a strong tendency to bury itself altogether in the land. After some years' use of the cultivator, during which I ploughed nothing but lea, and that was done with horses, and having also got quit of stones, or nearly so, I began to doubt whether I was right in having t soil so seldom completely turned over. I therefore got of Fowler's 4-share balance ploughs, which, besides ploughing stubble, enables me to plough lea and likewise land after a turnip crop, when I prefer having it done so. By taking off the mould-boards from this plough, it turns up the soil and throws it on edge, which is called digging. This plan has certainly several advantages over ordinary ploughing. When done immediately after harvest, the soil does not run together from the effects of the weather, which stiff lands are apt to do when ploughed early. It also exposes the largest possible surface to the atmosphere and to the effects of frost, but it does not destroy grasses or weeds in such an effectual manner as close and compact ploughing does. Unless the steam-harrow is used in spring on land that has been dug, it is found very rough for horses walking over; but when it has been done in time, the soil is easily reduced to a fine mellow state. This digging is very popular with my neighbours who have steam-power, but I have found it suitable only when practised early in autumn or before winter. The usual furrow we make on stubble land is about 10 inches in depth, and on lea and land after a turnip crop 8 inches is the rule. I may state the extent of land ploughed and grubbed annually is somewhat above 500 imperial acres. From accurate notes taken since last harvest, I find that from that date we have ploughed 294 imperial acres in fifty-four days, but in which are included five and a-half days for eleven changes from different fields. Though it commonly takes only from three and a-half to six hours for change, fixing the action, getting out the ropes and the steam up again, I have calculated half a day for each change. By dividing the 294 acres by the fifty-four days required for ploughing, then it gives very close to 5½ imperial acres as the work done daily. I must say I felt rather disappointed when I discovered this result, as on a square field of upwards of 40 imperial acres, ploughed immediately after harvest, the time taken was only five days, which gives 8 imperial acres daily. When we came to small fields with corners, and in the short winter days of from seven to eight working hours, the extent of ground gone over was much reduced. In the general average there is also included a 26-acre field of very stiff clay, where we had to use only three ploughshares instead of four to obtain the required depth of 10 inches; the time taken to it was six and a-half days, which gives only 4 acres daily. We have also grubbed since harvest 104 imperial acres, the time taken, including two and a-half days for five changes, being altogether fifteen days, or at the rate of 7 imperial acres daily. Here a 10-acre field again diminished the average amount of work done, as two and a-half days were taken for it. We have also used the steam-harrow, going over 40 acres twice in three days. Before turnips are sown another 100 acres must be grubbed, for which we may again add fifteen gh as the days are longer, the fields large, and the soil dry, I am confident it will be d shorter time. From the above we have

294	imp. acres	ploughed	in 54 days,	or say 5½	acres
104	,,	grubbed	in 15 days	7	acres
100	,,	(to be) ,,	in 15 days		
40	,,	harrowed twice	in 3½ days	12	acres
538	imperial acres		in 87½ days.		

In regard to the cost, it is naturally divided into— The interest on capital invested, and the tear wear of machinery and implements; and, The average amount of daily expenditure. In re to the first, it must to some extent be matte opinion. At all events, even if the amount of int was satisfactorily settled the cost of the amount vary according to the number of days the machine employed, and the greater or lesser number of over which it is thrown. In calculating this I not take exactly my own outlay, as I have on portable engine which requires two pairs of horses about an hour or an hour and a-half at each cha and for which I have allowed already, in char half a day for every such change. If I were to n any change in my machinery, it would be substitute a locomotive engine in place of the able one, as then no horses would be require move the engine and windlass; and in place of ha to empty the water out of the boiler at each cha the steam would always be up, and ready at on recommence work. I understand a 10-horse loco tive engine, with all the necessary apparatus, can b for £700. On this sum, I consider that for int on capital, and for tear and wear, 12 per cent. be found to be ample; indeed, taking my own ex ence, I think this above the mark, but assuming be 12, that sum would amount to £84 per an Again, as the wire rope wears faster than the parts of the machinery, I have no objections to sixpence per acre for all work done. On say 520 this comes to £13, which falls to be added to the making in all, £97. If this sum is divided by 87½ number of days the steam tackle has been at during the year, it gives £1, 2s. 3d. for each day. this falls to be added the second item, viz., the rage amount of daily expenditure, which can be e and accurately ascertained. With me it st thus:—

Five men and two boys' daily wages -	£0	1
One boy and horse half time, for water, &c.	0	
Coals, including carriage, ½ ton - -	0	
Oil - - - - - - - -	0	
Making the daily expenditure - -	£1	2
Interest, and wear and tear daily - -	1	2
Thus the cost of each day's work comes to	£2	4

I have already shewn the average daily work in ploughing is 5½ imperial acres, and the cost is thus 8s. 0½d. per imperial acre. Grubbing 7 acres daily comes to 6s. 4d. per acre. It will be observed that the work done is not much more than could be accomplished by two pairs of horses constantly employed throughout the year. I have put away two pairs of horses, having now nine pairs in place of eleven, and I never feel the want of them ; indeed, I sometimes think I might put away another pair, having this great advantage at the important periods of seed time in autumn and spring, and when preparing land for the potato and turnip crops, viz., the possession of an implement that can do the work of six pairs of horses, to say nothing of the superior quality of the work it does. Ever since I got steam power, and by means of it, every acre of my farm has been cultivated to a wish, and every crop also has been sown in good time, which all practical men know to be of great importance in a pecuniary point of view. Again, having all the corn and grass land without the vestige of a furrow, increases the crops, renders the land more suitable for the use of reaping-machines, and adds not a little to the beauty of a farm. The double engine and other systems of steam cultivation have their own peculiar advantages, but the fixed engine, and roundabout mode I have adopted, commends itself to me, first, by being so much cheaper to begin with than any of the others ; and, secondly, it leaves narrow headlands, and never poaches them, as the engine is frequently placed in the adjoining field to the one being cultivated, and is never moved from the gateway or spot where first placed.

Mr Greig, Harvieston, Stonehaven, said :—I quite agree with the Noble Marquis as to the advantages of deep cultivation, although I cannot concur with him that it can be attained with horse-power at the cost he states. Neither do I believe that the advantages which he states to be obtained from deep cultivation are to be realised in anything like the same proportion as from cultivation by steam to a similar depth. The great point in deep cultivation is to have the land thoroughly broken up and loosened, the subsoil scarified, without bringing any of it to the surface ; and, in my opinion, this cannot be attained by any plough drawn by horses. The Marquis has told us that his ploughs take a square furrow of about 15 inches. Now, I ask any gentleman present if land turned over in 15-inch blocks is good cultivation ? Besides, by that means too much of the subsoil is brought to the surface. In steam cultivation at the same depth it is very different. The steam digger, while going 15 inches deep, is only taking about 11 inches broad ; and the effect of this is, that while it loosens the subsoil it brings none of it to the surface. It breaks up the furrow before it can be displaced, leaving it in similar condition to land that has been dug by manual labour, and in the most perfect state for its aeration. In regard to improvement of the drainage by deep cultivation, we have ample testimony in Kincardineshire—on one farm in particular, Townhead of Arbuthnot. A great deal of the land on this farm consists of a stiff clay, with close, hard bottom, and although it has been well drained, the drainage was very imperfect previous to steam cultivation. I shall, with your permission, read a letter which I have received from Mr Brown, the tenant, on the subject. It will better explain to you the advantages which this tenant has derived from steam cultivation than I can. He says :—" I am sorry I cannot be in Edinburgh on Wednesday, as I feel a great interest in steam cultivation. My experience of it during the last three years is every day convincing me more and more that we are not far distant from its general introduction. Before I had steam cultivation my clay land was very wet, and often partially covered with water, through the drains acting badly. Now that same land is entirely altered in its character. It lies perfectly dry in winter, the drains flowing freely, the horse operations on it are a half easier done, and the crops are much improved. In regard to the cost, compared with horse work, I am a gainer. I pay the company from £40 to £50 a year, and, with other expenses, my steam cultivation costs me about £60. I require a pair of horses less than before, which, with tear and wear of implements, cost me about £100 a year. That shews a saving of about £40 annually. But this is not the greatest advantage I derive from steam. It is from the superior cultivation, which could not be compared with horse work." In the improvement of the drainage, the difference of a steam-driven implement from one drawn by horses for this purpose is manifestly in favour of steam. The great speed at which a steam-plough is travelling compared with that of a horse-plough, and the greater angle at which a steam-ploughshare stands to the subsoil, cause a continual tearing of its surface, scarifying, and breaking up the pan. Comparing steam with horses for light operations, such as cross cultivating for turnips, the mixing and bringing of the soil to a uniform quality is thoroughly attained by the steam-cultivator in the great speed at which it travels, tossing the land from tine to tine, thus mixing the exhausted and the unexhausted portions of the soil together. This, in Kincardineshire, has formed one of the most valuable operations of steam. The effect of it has been a perfect remedy for the " finger-and-toe " disease in turnips, which has of late years been so prevalent there. I shall, with your permission, read letters from Mr Alexander, Bent of Halkerton, Mr Johnston of Auchcairnie, and others in Kincardineshire, who have benefited to this extent. Mr Alexander, on 12th March last, writes :—" I will shortly state my experience of steam cultivation. The first 70 acres I dug (13 inches deep), I think, will be permanently improved 5s. an acre yearly, and, as a proof, I have to state that the turnips on this portion of the field were quite free from the disease called 'finger-and-toe,' while 4 acres ploughed in the ordinary way, 8 inches deep, were all but completely destroyed by this malady. Again, the grain crop this last peculiarly dry season was a good average, and I attribute this to the rootlets getting farther down, and the deep stirring keeping the moisture better. You must be aware that after such a depth an increased quantity of manure is necessary, and this precaution I took." Mr Johnston, of Auchcarnie, writing on 26th October 1867, says:—"I received yours in reference to the steam cultivator some time ago, and have deferred answering it until I saw how the crop turned out. I have now much satisfaction in stating that the turnips on the steam-cultivated portion of the field are much the best, and exempt from 'finger-and-toe,' which prevails more or less in the other part of the field." In regard to the cost of steam cultivation, compared with that of horses, I believe the advantage to be decidedly on the side of steam. I shall read to you what Mr Alexander, of Bent of Halkerton, said on this subject, at a meeting of the Fettercairn Farmers' Club last Christmas:—"I have now to say what I believe are the advantages of steam power over animal in the cultivation of the soil. It is generally admitted that a deep tilth is better than a shallow, and the more the subsoil is broken the better. We all know that subsoiling with horses is very expensive and very difficult to do, if done efficiently. Suppose a pair of horses in a plough taking an 8-inch deep furrow, and suppose a subsoil plough following with four horses, and loosening the subsoil other 5 inches, and suppose they go over an acre a day, what will be the cost of this operation per acre? Ten shillings a day for each pair of horses, you will all agree, is a very moderate charge, and if you take two shillings and sixpence for tear and wear of implements, you will find the cost per acre to be £1, 12s. 6d. I will now contrast this with steam-power doing the same work. In the autumn of 1866, I had 70 acres of stubble dug with the Kincardineshire Steam Company's tackle to a depth of 13 inches—the same depth I have supposed being done by horses—and the cost of this at that time, including coals and a man and horse to drive the water, was fifteen shillings per acre. You will thus see that there is an actual saving by using steam rather than horses of 17s. 6d. per acre, keeping out of view the superior manner the steam did the work." I believe that the one set of steam-cultivating tackle which we have in Kincardineshire has displaced at least twenty horses, and would displace double the [illegible] if the arrangements of the Steam Ploughing Company were such that the farmers employing [illegible] could depend upon them for their [illegible] this Mr Garland, Cairn[illegible] Company writes:—[illegible] 2th, asking [illegible] have now [illegible] and am very much pleased with the work of the plough, digger, and cultivator. I am so much pleased that I have put away one pair of horses this season, and I hope next year to dispense with another pair, and several of my neighbours have likewise reduced their stock of horses." I have letters from other gentlemen on the subject. One is from Lord Arbuthnott, who was very anxious to be present and give his testimony to the meeting as to the advantages he has derived from the steam cultivator. His lordship, who wrote on 15th March, says:—"I have received your letter, and have great pleasure in being able to testify to the great advantage derived from the use of the steam-plough in this part of the country. I have now had the plough working upon my own farm for several years, and am satisfied that the advantages to be derived from it only require to be better known to bring the implement into general use." Hercules Scott, Esq., of Brotherton, who takes a great interest in agriculture, and who is very practical, wrote me on 5th September 1867 as follows:—"Sir,—I delayed replying to your note of inquiry till I should have taken another look at the subjects operated on by the steam digger. I have every reason to be satisfied with its work on my field. The appearance of the swedes is just as fine as I could wish. I think the subsoil was well stirred, and where there was an underlying 'pan' it was broken. I could see this by the frequent streaks of high-coloured, reddish stuff brought up as the digging proceeded. I should say that during the late continued rainy weather the loosening of this impervious substratum must have been of value to the plants, as the moisture would thus get down, instead of lying about the roots. I have had a 7-horse single-engine plough on my own farm for the last two years, and I have found it a most profitable investment. I find that I have no difficulty in employing my engine all the year over. When I am not ploughing I am thrashing, and I have also succeeded in making it do part of my carriages on the roads, having trucks for the purpose. I believe that this must be accomplished by a farmer before he can derive the full benefit from a steam plough, if confined to one farm; but I believe that companies, such as the Kincardineshire Steam Ploughing Company which has emanated very much from the liberal spirit of the proprietors of Kincardineshire, is the most practical form which steam cultivation is likely to take in the north of Scotland. Mr Hope says that if he was to make a change, he would have a traction engine. Now, I don't see how Mr Hope could bring the two things very consistently together—to have a traction engine and to work it on the roundabout system; for I always believed that the only advantage of the roundabout system was, that you had it at much less cost than a direct acting set of tackle, and which would not the case if accompanied by a *good* traction engine.

ADULTERATION OF FEEDING STUFFS AND ARTIFICIAL MANURES.

BY PROFESSOR VOELCKER.

An Address delivered before the Royal Agricultural Society.

HAPPILY for me, but unfortunately for the agricultural community, the subject which I have the honour of introducing for discussion to-night is so full of material that I need not go in search of any extraneous matter to fill up the hour usually allotted to the opener of our meetings. It is patent to all who have given any attention to the subject, that both feeding materials and artificial manures are adulterated to an enormous extent; and though it be quite true, as is generally acknowledged, that fraudulent dealing on the part of unprincipled men is encouraged in a measure by a certain class of agriculturists, who will beat down the honest manufacturer to a price at which it is impossible to furnish a genuine article, it is, nevertheless, a fact that both high-priced feeding materials and manures are liable to be largely adulterated. I need hardly say that one of the very best safeguards against imposition is a thorough acquaintance with the character and properties of the materials with which you have to deal; for unless you are acquainted with the properties of the genuine rticle, you are not likely to recognise with much cility any spurious or injurious substance which may ther carelessly or fraudulently be mixed with your ding-cake.

LINSEED CAKE.

Beginning, then, with the most important of all urchased feeding-stuffs—linseed cake—let me point ut briefly its characteristic properties. Good linseed ke should have an agreeable taste; it should have mouldy appearance, and when mixed in the pro- rtion of 100 grains to 4 oz. of water, it should form thick jelly, which one might almost taste with easure. I always think the perfection of linseed ke is, that you could wish to be a cow in order to be le thoroughly to relish it. A bad cake never has a od taste, never makes a jelly if you mix the wdered linseed cake with water in the proportions st indicated. Linseed in this country varies very uch in quality, and it is held to be an excuse for the anufacture of impure cake that the makers cannot ways obtain the genuine seed. But no such excuse ould be allowed. Most of the foreign seeds und in linseed are smaller, and can be readily moved by sifting, and the maker of linseed cake ho is determined to use a pure article can do so th really very little trouble. The seeds which sifted out from the linseed as it is imported are quently again mixed with fresh portions of linseed ich go back under some assumed name, perhaps as Tilsit, Petersburgs, &c. I have heard of seeds sifted out of the siftings being carried out to sea, where a ship comes alongside, and an interchange is made of this seed which has more than its proper share of weed seed. The cake made from this kind of material is made to a large extent at Hull. You may observe that many of the cakes sold as genuine linseed are really genuine bad cakes. I have examined many, and have here a specimen where it is very difficult to find any linseed at all. The sample in this bottle contains more than 80 per cent. of foreign seed or siftings. These siftings, let me add, are not by any means valueless, for they fetch a fair price in the market, as they may be pressed into cake, which is sold under the name of siftings-cake to makers who regularly deal in mixed feeding-cakes. In buying linseed, then, you ought to be careful that you get a guarantee that the cake is pure and not merely genuine. I have here several parcels which would be called genuine which are very bad indeed, because they contain too much of the foreign seed, some of which are not merely indifferent as feeding substances, but downright poisonous and injurious. The farmer in buying these cakes runs considerable risk of doing positive injury to his stock, and for this reason I would strongly recommend you to use a pure linseed, and give encouragement to those companies or private firms who make nothing but pure linseed cake. I am happy to say there are at the present time some mills in which nothing but pure cake is made. I wish I could say there are a good many, but I know only some eight or ten, and not more I think in all the country. If it be remembered that in Hull there are at least forty oil-mills, and if it be borne in mind that I have had excellent opportunities of forming a fair estimate of the proportions of pure and mixed cake makers, you will all agree with me it is a matter of deep regret to have to arrive at the conclusion at which I have arrived—namely, that there is scarcely 10 per cent. of the oil-mills of England that turn out a pure article. One remark I must make that may be useful to you; it is that hard cakes, though they require a little manipulation on the part of a farmer, sometimes are the very best cakes that can be obtained. The cake is very dry, and requires to be broken up fine and soaked in water before it should be given to stock. After all, this hardness is a positive advantage, for it preserves the cake, and protects it against the pernicious influences of our damp atmosphere. In a moderately well ventilated barn this kind of cake can be kept for years and years without deterioration. Some of the softer cakes very rapidly become mouldy; and I need hardly say that mouldiness spoils the cake, and to such an extent that some follow the practice of mixing the spoiled cake again with a little fresh linseed or bran, and then sending it out as mixed, or professedly bran cakes. Many of the bran cakes have the germ of fungi in them; and if you put them in damp places, the natural consequence is rapid mouldiness, and great injury to the stock fed upon it. The cake I hold in my hand is one of the kind; the mouldiness is apparent in the centre, probably because several cakes have evidently been heaped together. If you want to keep your cake well, it is desirable to put it in a barn edgeways, so that a current of air may pass through it, or else the cake is soon spoiled. Here you have a cake which is adulterated, not with one, but a variety of things, with cotton-cake, wit hbran, with earth-nut cake, and with cocoa-nut cake. The following substances are frequently used in the manufacture of mixed cake:—Palm nut, oat dust and barley dust (in other words, the refuse of the manufacture of the oatmeal and pearl barley), rice dust (obtained in gleaning rice for the market, and generally known as rice-meal), beech-nut cake, hempseed and the cake manufactured from it, and locust beans. There is another ingredient which has but lately come under my notice, and that is indigo seed. I have a specimen of cake made from that. I should not have discovered the presence of indigo seed in oilcake but for the fact that the seed pressed into cake had been sent to me by a manufacturer, with an inquiry whether it might be safely mixed with feeding cakes. I believe this indigo seed is not poisonous, but it has a disagreeable taste, and possesses very little nutritious value. I ought perhaps here to say that most of these adulterating materials are harmless in themselves, while some of them, like locust beans, possess an undoubted feeding value. The proportion of sugar in the carob bean is very large; locust beans have considerable feeding qualities, and also bran, which is a good material in its place. Still, in comparison with good linseed-cake, these things do not possess what we might designate a high-feeding value, because they contain more of the woody fibre than linseed, while the proportion of oil in pure linseed cake is considerable, and much greater than in bran. Although bran is a useful food in its way, I would strongly recommend you to make your own mixture at home. In that case you can mix pure linseed cake and bran in the proportions which experience tells you will best suit your stock. But whilst many of these adulterating materials are comparatively harmless, or, in a few cases even nutritious, there are some, on the other hand, which are highly poisonous. Not long ago there was a case tried in the court of Common Pleas where an importer of cake claimed heavy damages or having been supplied by a Bombay house with cake which, to all appearance was a first-rate article, [illegible] in every respect. The cake was sold in England; and it was not long before found out that it was doing considerable harm cattle that had been feeding upon it; and I sure whether some of the stock did not die. upon examining the cake, I found castor-oil l it. An ordinary analysis would not have this fact to light; but a strict microscopic e tion left no doubt whatever that a considerab tity of castor-oil beans had been mixed v Indian linseed. Another material I found las for the first time in linseed cake was sti poisonous. It was a bean known as th bean. A single bean is quite enough t a man very sick, for it is very drastic in its ef comes from the Cape de Verde Islands. T of cake is made, I believe, chiefly at Bris can only be used for manuring purposes smallest admixture in feeding cake renders th poisonous.

RAPE-CAKE.

Now for a few observations on rape-cake. be made from good clean rape-seed, that i from seed which does not contain, like som Indian rape seed, quantities of wild mustard. of the Indian rape-seed is so full of this that t when it gets into the stomachs of the cattle, so pungent that it blisters the intestinal ca of course, causes serious injury, if it does no animal. The only description of rape-cake safe to use is French or German green cake. not like to say that mustard is purposely mi rape-seed, because it is known that they grow in the fields of India, where the agriculturist weed so carefully as we are in the habit of dc where the wild mustard spreads with wonde dity upon ill-managed farms. It often hap the seeds from which Indian rape-cake is so largely contaminated with mustard that o the powdered cake with water, you get a pas you might use with your beef without doing much injury. I have a specimen of cake he even now smells and tastes palpably of Never forget that there are ready means of this kind of adulteration. All you have t pound the cake into coarse powder, and m water. Leave it to stand for twenty-four fore you examine it; for it it is well to remen the pungent oil of mustard does not exist read in the seed, but is produced by a certain fern in the ingredients of which the cake is made.

COTTON CAKE.

Cotton cake requires our attention next. two kinds, and neither of them is much adı although occasionally both are sold to the far very inferior quality. Decorticated cake is the cotton seed, after the shell is carefully I have here some really excellent specimens ticated cotton cake. When pure, it is of yellow colour, and tastes as sweet as a nut.

why we should not call it a nut, since it is f the cotton seed. When stale, the cake lour; becomes darker, and is very apt ldy in damp localities. Here is a hich I have labelled "poisonous to mouldy." In its pure state it is not so, ess develops a poisonous fungus. Ordi- ake, which is made from the whole seed, well ground in the mill, and the husk duced to as fine a powder as possible. d seed becomes injurious by being indi- ccasionally an extra quantity of the husk he ordinary whole seed cotton cake, which s, as a matter of course, inferior in feed- It is difficult to recognise this species of by ordinary inspection; but chemical discover it. From a table of comparative ich I have prepared here, you perceive a great difference in the feeding quality seed cotton cake. The amount of husk to 50 per cent. of the whole cake, and I present price of from £8 to £8, 10s. per dearest cake you can possibly buy. I ecommend the use of cotton-cake when s above £7 per ton.

ARTIFICIAL MANURES.

v hasten on to the second division of my adulteration of artificial manures. If h the farmer sustains by buying inferior rials is to be lamented, the loss which the use of adulterated manures is much leplored, because the injury done by the adulterated or inferior manures is not eptible, and many a man goes on for a thout being aware of the real cause of p at which he wonders and repines. I very anxious to be much more severe s in adulterated guanos, or very grossly nanures of other kinds. In a certain e all must have observed, the farmer can elf in buying feeding materials, but he me facility of protection in the purchase anures. You cannot by any inspection ther guano is adulterated or not. I defy pt in guano to tell me whether this re me is genuine or otherwise, it is so ine article. Chemical skill is required etection, but chemical skill can do it. at these fraudulent transactions are so mmon and extensive than the dealings feeding materials can possibly be.

PERUVIAN GUANO.

however, one or two things which it may ou to remember, inasmuch as they will detect pure Peruvian guano from the inds. The best Peruvian guano always specific gravity than adulterated kinds. a bushel of the genuine stuff you will find its weight per bushel does not exceed 69 lb. It is usually from 68 lb. to 69 lb. per bushel; that is to say, a bushel measure filled and struck off. Adulterated guano always weighs more. This surely is a simple way of testing the value of guano. Another equally simple way is to burn a small quantity. If you have the appliances to do it by careful weight, take 100 grains. Should the guano be genuine it will leave one-third of its weight in ash, which is perfectly white; in other words, 66 grains will burn away, and 34 will remain in the form I have stated. If the guano be adulterated it will leave perhaps more than one-half of its weight in ash, and the ash will invariably be coloured, since the earthy matters which are usually employed contain oxide of iron, and that compound causes the ash to be of a brownish or yellow brown colour. Genuine Peruvian guano yields —or perhaps I ought to say yielded—from 17 to 19 per cent. of ammonia. At the present time, however, you must be satisfied if you can get 16 per cent. I very much fear the supply of guano will come to an end within no very remote period, for certainly the average cargoes are not so good as they were some eight or ten years ago. This is why I say you must be satisfied if in the best government Peruvian guano you can get 16 per cent. of ammonia; whereas formerly it was by no means uncommon to get 18 and 19 per cent., and I have had samples indeed which revealed 20 per cent. The materials that are mixed with guano are gypsum, chalk, and certain yellowish loams which abound in the mouths of the Mersey, Liverpool being one of the chief depots of mixed guanos. Liverpool, indeed, is famous in one respect for the mixing of guanos, in the same way as Hull is famous for the mixing of feeding-cakes; neither of them can be said to enjoy an enviable notoriety.

CAUTIONS.

Let me here add a word of warning while speaking of Peruvian guano. Never buy guano which is offered at auction. Follow my advice; ask no questions—but when anybody offers guano by auction have nothing to do with it. If you do, blame yourselves if you are taken in. I have never yet seen genuine Peruvian guano sold in such a way in small lots to the consumer. Never put dependence upon any analysis of mine, or that of an equally respectable chemist. Remember the analysis only proves the composition of the sample which was submitted to me at the time; it offers no guarantee that what you get shall be the same. These analyses, I am sorry to say, are frequently made for mere gain; they enable the unprincipled dealer to sell spurious articles to ignorant men. It frequently happens that when guanos are offered for sale an analysis is shewn with them of a highly recommendatory character, whereas the bulk which is sold to the unwary purchaser is totally different from the sample which was submited to the analyst's hand. Within the last few weeks I have had no less than four distinct cases the grossest fraud of this description brought under my notice, in which guanos have been sold by auction; and I fear in one case I have been unwittingly the instrument of inducing farmers to buy adulterated compounds. A sample was sent to me, and analysed according to request, and I know positively it was afterwards mixed with a large quantity of yellow sandy loam, and sold by auction as genuine material on the strength of my analysis. It was sold at prices varying from £7 to £9 per ton, and yet it was not worth more than £2 to £3. Is it likely that so valuable a material as Peruvian guano can be sold at a price considerably lower than what you would give were you to buy a whole cargo? Notwithstanding this, purchased it was when offered for sale; and the surprising thing is that farmers will persist in buying guano (as they think) at £9 or £10, or sometimes at a lower rate per ton than that.

NITRATE OF SODA.

Nitrate of soda, I fear, this year will be very frequently mixed with common salt, because the high price of the former offers a strong inducement to unprincipled persons to use the latter. Only the day before yesterday a person came into my laboratory with a sample of nitrate of soda. He complained of its high price, and said, "What are we to do this year? Farmers won't pay more than £15. We are obliged, you see, to mix common salt with it, or we should not be able to sell any." I give you these words as I received them, and without any comment of my own.

OTHER MANURES.

Sulphate of ammonia is another valuable manure which is occasionally adulterated, the chief adulterating principles being sulphate of magnesia or Epsom salts, sulphate of soda or Glauber salt. During last week I had several samples adulterated with these things. Bone-dust is not often adulterated, unless you buy it in a very fine powder, and then you run the risk of getting gypsum mixed with it, or you may possibly get with it vegetable ivory, which resembles fine bone-dust very closely. From a manurial point of view this is not worth anything; but it is good as an adulterating principle, and the button manufacturers of Birmingham will not take less than £2, 10s. or £3 a ton for it. Dissolved bones and superphosphates are sold in the markets at high prices, and the prices which you ought to give for this description of artificial manures should be regulated entirely by their quality. You cannot fix one uniform price for superphosphates; everything depends upon the composition. You cannot look into the composition of the sample which is shewn to you. I am often amazed by men who look very knowingly as they smell and ook at superphosphates, as if they could smell out the per-centage of a soluble phosphate or of ammonia which they contain. In a fixed or combined condition ammonia does not smell; there is only one way of determining the value of superphosphate, and that is by analysis. The constituents which chiefl
the value of this description of fertilizing a
soluble phosphate, insoluble phosphate, an
or ammonia. The more you have of soluble
and bone phosphate, and of nitrogen, the
artificial manure, and of course the more yo
to pay for it. There are some mixed art
nures, the names of which do not exactly inc
true character.

BLOOD MANURES.

For instance, there are a good many ki
nure sold under the name of blood manu
fact, there is very little blood used in the
ture of manures. Where is all the bloo
from that would make all the manures sold
name? Some of the manures, nevertheles
good—not on account of the blood, but
things of which they are made. Whilst s
materials, as blood, or even woollen refus
ful in furnishing nitrogen to the growing
sufficient readiness, there are others whi
decompose, and which are only added wit
of deceiving both the consumer and the ch
advises him.

LEATHER.

There is a description of nitrogenous ma
contains a good deal of leather. People sa
is nothing like leather." I say leather is o
in manure, even after it is steamed and s
the action of sulphuric acid. Leather is s
do what you will with it.

THE SUMMING UP.

And now to sum up briefly the various
which I have spoken in detail during th
this address, and to throw out a few
which may be useful to intending purcha
ficial [feeding-stuffs or manures. In buyi
cakes get a guarantee from the dealer that
and be not satisfied with a guarantee o
merely genuine. If you have any doubt o
ineness of the cake, send a sample for e
to a competent chemist. I would advis
to encourage the manufacture of mixed c
Become your own mixers; buy the raw
and make your mixtures as you please.
want to get a mixed cotton and linseed an
cake. If you buy earth-nut cake of go
you will find it very useful. Buy the cake
and mix them with bean-meal, or a cert
tion of bran, which you will find answe
well. In buying guano, it suffices to have
tee of the dealer that the article is Peruvi
ment guano of the best quality. You
analysis—the guarantee is sufficient.
nitrate of soda, buy according to the per
pure nitrate; in good samples you should
to 95 per cent. Sulphate of ammonia bu
to the per-centage of ammonia; in good

you ought to get from 22 to 24 per cent. A e that bone-dust is genuine will be quite suffi- n buying superphosphates, the first thing you o is to make up your mind as to what you want. require mineral superphosphate or bone

According to your requirements let the e be shaped. Mineral superphosphates are en your land is in first-rate order; when it is light, or has been manured previously in they are very useful, and in buying them, all require is to have the per-centage of soluble e guaranteed. If, on the other hand, you manures, you not only require the per-centage phosphates guaranteed, but also that of the phosphates; and, moreover, a distinct under- that the insoluble phosphates are present bone, and not in the shape of coprolite Estramadura phosphate, or any other de- of mineral phosphate.

MANURE ASSOCIATIONS.

dd a few remarks upon the advantages or ages of those associations which have lately p in several quarters, and which, under idance, may prove extremely useful to the al community? In some localities manure ns have been established—associations of ho buy artificial manure in considerable quantities, and then supply their members at wholesale prices with the manure, which is guaranteed in the first place to be of a certain strength and quality. Much good may be done by this co-operative system, provided you exercise sufficient supervision over those who supply your contracts. A manufacturer who guarantees to supply a manure association of farmers with superphosphates containing 24 or 25 per cent. of soluble phosphate may have the best intentions of fulfilling his contracts literally, but may not always be able to do it. It is not, therefore, superfluous for me to caution those who are supplied from these associations with superphosphate of guaranteed strength, to take care that they get from their own officers what they are supposed to obtain. I cannot see how it is possible to secure to the individual consumer that he gets the real article if the manure is delivered to him in small quantities. The manufacturer should deliver it in bulk at one time; or if it be delivered at different times, with each delivery a fair sample should be drawn from the bulk, and afterwards tested. If small parcels are sent direct from the manure works to the individual farmers, I cannot see how you can control the quality of the article. I would, therefore, urge every caution in managing these manure associations; else the very object you have in view—namely, self-protection—may be defeated altogether.

Notes and Queries.

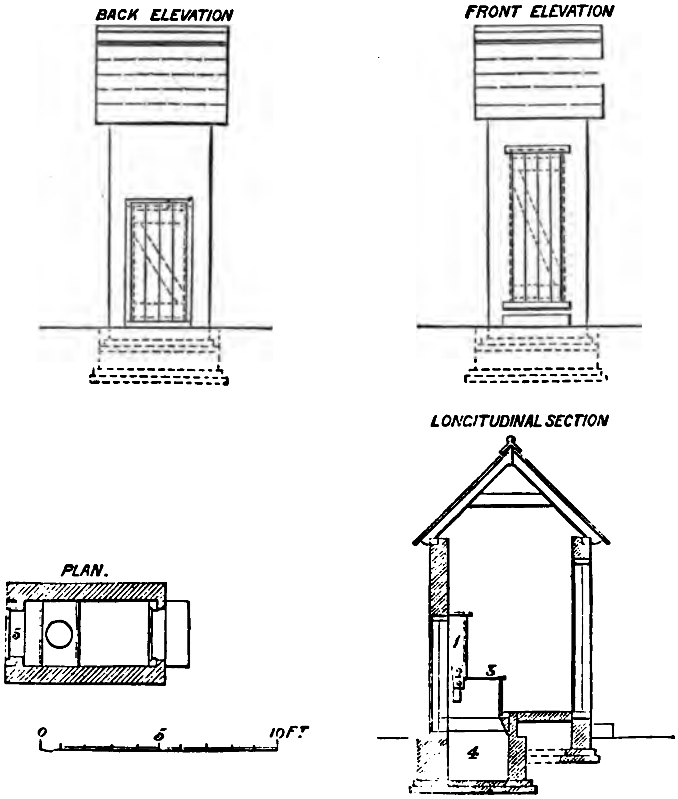
LIV. MALT DRYING.

THIS process is usually effected by what is known as "kiln-drying." In this system the malt to be dried is placed upon tiles or iron plates, perforated with holes, which serve as the floor for supporting the malt. The heated air is obtained from a furnace or open basket fires placed in an apartment below the tiles; the air passing up through the apertures in the floor, through and amongst the malt lying on it, and the evolved moisture is carried off through apertures made in the roof of the kiln. The slightest consideration will suffice to shew that this process of drying must necessarily be a very uncertain one as regards its results. There is obviously no means of regulating the degree of heat to which the malt is subjected, and the amount or degree of drying which is aimed at. If we take as the standard of perfection in a malt-drying process, that every individual grain should have all its surface subjected to the drying process, and that the process should be so much under control as that it may be regulated to give all degrees of drying, from the merest shade of surface desiccation up to any required amount of surface scorching, we shall see that the process of kiln-drying is thoroughly and inherently defective. We say inherently; let us see how this may be. The malt to be dried is placed in a layer of considerable thickness on the kiln floor. As the steam or vapour from the under portions nearest the kiln floor rises up through the mass above it, it is partially condensed by the grains of this mass, which are colder than those below; this imparts to them a degree of moisture, which it is nevertheless the very aim of the process to do away with. The mass, if strictly examined, will be found to be made up of a series of layers, all of which differ from one another in their degrees of drying. This can be easily ested by the hygrometer. And in order to bring about at degree of uniformity of condition of the mass, and o enable the upper portions to be placed in contact ith the heated plates, or nearer to them than they e before, it is turned over by means of the shovel. ny one who knows how that process is carried nd what in reality it consists of, know that formity aimed at cannot possibly be secured by thing so uncertain in its effects as the process of and-shovelling. The chances are all against the oper transposition of the layers being effected proly; in short, there is no certainty in the process. rther, the apertures in the floor plates are apt to , as they often are, stopped up, and the currents of r which are supposed to be passing through the mass are discontinued greatly to the deterioration of the mass. Again, from the frequently defective ventilation of the upper part of the kiln, the moisture is not carried off sufficiently rapid, and the result is, that it condenses on the walls and roof, dropping from the one, and trickling down the other, and thus wetting the malt below. Still further, from the mode of heating adopted, it often happens that the lower layers are either scorched or burned, and noxious vapours (markedly sulphur) passed through and in contact with the malt; both of these causes tending very much to deteriorate the quality o malt for brewing purposes. *We have, indeed, n hesitation in saying that we believe a frequent cause o unsatisfactory brewing is caused, and caused alone, b the condition of the malt brought about by these tw causes.* It is evident that a *malt of uniform quality* i the point desiderated. Yet this uniform condition can not, we venture to maintain, be secured by the proces of kiln-drying in ordinary use. But we believe that uniformly good condition of the malt can be obtaine by placing it under the influence of currents of hot ai produced by the *thermanterion*, so that all the grai making up the mass may be subjected to the influenc of the passing air; and that the temperature of th air can be regulated or controlled to any required de gree of nicety. By its use the maltster will obtain th closest approach to the natural mode of drying. Th process is not a problematical one, as far as its results i the brewery are concerned. It was tried some yea ago in one of the largest breweries in London, an whenever the malt dried by the use of curren of heated air was used the brew was invariabl superior. It so happened, however, that the mod adopted of applying the hot air was so expen sive, involving as it did complicated structur arrangements in the malting-house, that it was n generally introduced. The system of the patentee the *thermanterion* is, however, so simple, that maltin may be carried on with the minimum of expense an the maximum of efficiency. We have no hesitatio in stating that the introduction of the mode of dryin malt by rapid currents of heated air will yet revol tionize the trade, and introduce a degree of certaint in the process of brewing not yet attained. This wi be further secured when, in addition to the drying malt, the process will be applied generally to th drying of hops.

LV. MOULE'S PATENT EARTH CLOSETS.

A correspondent has sent us the following descrip tion of this closet, in reply to the inquiry made som time ago respecting it in "Notes and Queries:"-

Among other improvements introduced by the Wimbledon Association at the camp last year was the Moule patent earth closet system, whereby earth is substituted for water, and notwithstanding the very trying test to which it was subjected on account of the excessive heat, which, although favourable to the rapid drying of the soil, was yet creative of other conditions increasing the difficulties attendant on fæcal deodorization, the strongest possible testimony was borne to its efficacy in completely removing all annoyance to sight or smell. Altogether about 148 dry-earth closets and urinals were in operation at Wimbledon; and when it is remembered that about forty or fifty of these closets were used daily by not less than 2000 men, at the same time preventing the least approach to any objectionable effluvium; the measure of success may be said to have been complete; and since these dry-earth closets have stood the test of such repeated use, it seems to us as a matter of course that they must be in every way suitable for the exigencies of rural districts, where the detestable open privy reigns now supreme. The invention itself is founded mainly on the fact of the deodorizing power inherent in earth, a given quantity of the latter destroying all smell, and entirely preventing noxious vapours and other discomforts. The practical application of this power consists in a reservoir for containing dry earth, and in an apparatus for measuring and delivering the requisite quantity so as to deal with every operation in detail. In applying this system to an ordinary fixed closet, the apparatus requires to be placed at the back of and in connexion with the usual seat, the reservoir for containing the earth being placed above it. Under it there should be a chamber or vault about 4 feet by 3 wide, and of any convenient depth, with a paved or asphalted bottom, and the sides lined with cement. Into this the deposits and earth fall, and may remain there six or twelve months, and continue perfectly inodorous and innoxious, merely requiring to be levelled by a rake or hoe. By one form of construction the pulling up of a handle releases a sufficient quantity of the dry earth, which is thrown into the pit or vault, covering the deposit, and completely preventing all smell. By another, the same effect is produced by the action of the seat. The apparatus may be placed in, and adapted to, almost every existing closet or privy, and so arranged that the supply and removal of earth may be carried on inside or outside as desired. The accompanying designs will give the



Moule's Earth Closets.

reader some idea how the apparatus may be adapted to privies. Of course the form of building may be altered at pleasure, and the same mechanical arrangement may be adopted in existing privies. Fig. 1 shews different views of a single closet. In the plan and longitudinal section, 1 is the earth-box; 2, the hopper; 3, seat; 4, vault; 5, door at back to enable earth-box to be filled and vault emptied. This, however, is not necessary when the box is filled and the vault emptied from the inside. The first requirement for the proper working of the earth closet is earth perfectly dry and sifted. Earth alone is proved to be the best deodorizer, and far superior to any disinfectants; but where it is difficult to obtain earth abundantly, sifted ashes, as before stated, may be mixed with it in proportion of two of earth to one of ashes. As the requirement is *dry earth sifted*, and as this is usually thought to be a great difficulty in the way of the adoption of the dry earth system, the following remarks will at once remove such an impression. The earth commode and closet, if used by six persons daily, will require on an average about 1 cwt. of earth per week. This may be dried for family use in a drawer made to fit under the kitchen-range, and which may be filled with earth one morning and left until the next. The drawer should reach to within 2 inches of the bottom bar of the grate. A frame with a handle, covered with fine wire-netting, forming a kind of shovel, should be placed on this drawer; the finer ashes will fall through, mixing with the earth, whilst the cinders will remain on the top, to be from time to time thrown on the fire. If required for a larger number, or when two or three closets are in use, the small portable dryer will be found very useful; and it has the advantage of being available for any of the ordinary purposes of a hot plate. The consumption of earth for one hundred people would be less than a ton per week. In this case the same dryer will dry a sufficient quantity for the week, with three or four day's use. For barracks, unions, mills, infirmaries, hospitals, asylums, gaols, &c., a fixed dryer, made with brick work, a plan for building which may be had on application to the makers, is better adapted. The necessary sifting is easily effected by means of a riddle, 3 feet square, and similar to those used in sifting wheat; or when the consumption is small, a small sieve will be sufficient. It should always be remembered that the same earth, having been kept in a dry place for four or five weeks, may be dried and used four or five times if desired, with the same deodorizing effect, the product increasing in alue. As the product is perfectly inodorous, it may be removed at any time without offence to smell or sight. Of course the most economical method is to ovide in the summer time a winter store of dry th, which may be kept in an out-house, shed, or her convenient place, just as we lay in a winter store coals

LVI. FILTERING CISTERNS.

The importance of a supply of pure water, both for the household and the farm steading, need not be here enlarged upon. There can be no doubt of the fact that water is an important and valuable element; and it follows that the purer it is the better it must be for the health of those partaking of it. Purification of water divides itself into two branches—first, that which operates chemically; and second, that which operates mechanically upon the water. It is with the latter we have to do at present, reserving the chemical feature for a future note. In many cases a supply of water can be obtained, but it is often turbid and full of suspended matter. This can be most easily got rid of by passing the water through a filtering cistern. Filtration in this way may be carried out by one of two modes, the "ascending" current, as in fig. 1, and the "descending," as in fig. 2. In fig. 1, *a a* represents part of the cistern or tank, *b b* a watertight division at one end; this stops short of the bottom, leaving a space, *c*, stretching across the whole breadth of the cistern; this is filled up with a sheet of finely perforated zinc, *c*. The bottom of the division at the end is filled up as follows:—At *g*, layers of wood, mixed with charcoal; a layer of sand at *f*, and layers of pebbles or well-washed gravel at top, *e*. The filtered water is withdrawn at *d*. In fig. 2, *a a* is the cistern, with division, *b*, stopping short of the top, and the space filled in as before. The overflow of the water from the cistern, *a a*, passes through *c*, and descends through the filtering material, *e h*, *g f*, arranged in the reverse order, as in fig. 1, the whole resting upon a perforated galvanized iron plate, *e e*, the water being withdrawn from *d*. While on the

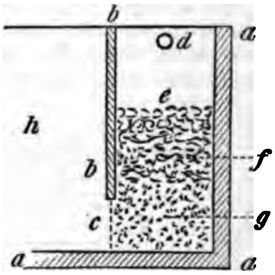


Fig. 1.

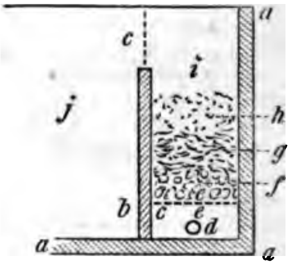


Fig. 2.

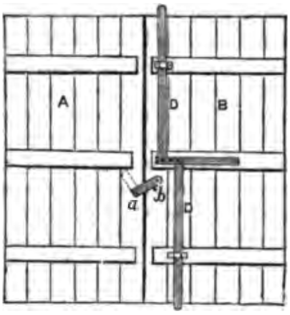
subject of filtration, it may be worthy of the notice of the reader to know that, in some cases, where—especially when the wells are shallow and the water comes off boggy land—the water is thick and of bad quality, it may be purified to a large extent by simply throwing in a quantity of good sharp clean gravel.

LVII. THE CULTIVATION OF GORSE AS A FORAGE PLANT.

I have read many articles on the edibility of the gorse or whin, which grows spontaneously in certain soils. I have seen instruments, more or less complex, for reducing its stalks to a kind of fodder. But no one seems to be occupied in improving this plant. In the *Journal d'Agriculture Pratique* I find an excellent article by M. Bodin, who recommends this plant for newly-reclaimed soil, but he adds—"I would not advise its cultivation in rich soils, or where more abundant fodder could easily be produced." On this latter point I beg leave to differ. I think, if the farmer would gain good results from poor soil, greater advantage would be obtained from rich soil. The common whin, *Ulex Europæus*, is the only kind I have cultivated, because it is the stronger. If a less thorny kind were discovered, it would be preferable. Like M. Bodin, I sow it as a spring cereal, or alone, at the rate of half a kilogramme the acre. The soil must be copiously manured the preceding year. A clay soil, well ploughed and cleaned, is best adapted for this plant. In the following spring it is well harrowed, and the plant is allowed to grow the first year. The second or third winter, according to its strength, it is cut close to the ground. This first crop is neither very abundant nor of very good quality, but it improves rapidly if the weeds are removed by repeated harrowings after each crop, and the strength of the plant is maintained by manure. Perhaps it would be an advantage to cultivate in lines. It would succeed very well on lands intended for inclosures, but it would be more thorny. The stalks are cut down, and quickly passed through a cutting machine, and then given to the cattle, which they eagerly devour. Young cattle require it to be cut much smaller. It would be easy to obtain a more tender fodder for these, by cutting towards the end of June, but this would diminish the quantity, and might exhaust the plant. My horses receive from 8 to 10 kilogrammes the head. Four acres grow sufficient to last from November to March. This is very cheap food, since it requires very little cultivation, and does not suffer from atmospheric influence. It fattens the cattle, makes the skin glossy, and strengthens cattle for severe labour.—R. S. B.

LVIII. A SIMPLE BARN-DOOR FASTENER.

I send you a drawing of a barn-door fastener. It hardly needs any explanation. *a b* represent the two doors inside; *d d* two standards attached to the lever *c* by tenons, fitting sufficiently loose to allow the lever to work up and down. The lever is bolted to the cross-piece of the door midway between the standards *d d*. By raising the lever the upper standard drops out of its fastening, and the lower rises from the same. The fastening for the other door is nothing but a block of wood 6 or 8 inches long and 1½ thick, and one of the same on the opposite side of the door, fastened together by a pin at *a*, and resting on a pin at *b*. The dotted lines shew the position of the fastening when the door is open.—*M. E. M.*, *in Albany Cultivator.*

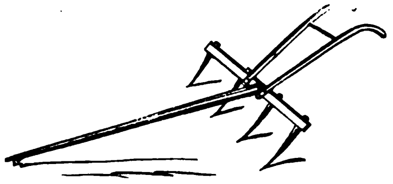


LIX. ON THE ECONOMIZATION OF FEEDING-STUFFS.

In continuation of Note XLVI. under the same heading in last number, we give the following upon some points connected with straw, from a lecture by Dr Cameron :—"When straw in an unprepared state is consumed, there is no doubt but that a large proportion of its cellulose remains unappropriated; nay, more, it is equally certain that the hard woody fibre protects, by enveloping them, the soluble and easily digested constituents of the straw from the action of the gastric juice. I would therefore recommend that straw should be either cooked or fermented before being made use of; in either of these states its constituents are far more digestible than when the straw is merely cut, or even when it is chaffed. An excellent mode of treating straw is to reduce it to chaff, subject to the action of steam, and mix it with roots and oilcake or corn. A better and cheaper plan is to mix the straw with sliced roots, moisten the mass with water, and allow it to remain until a slight fermentation has set in. This process effectually softens and disintegrates, so to speak, the woody fibre, and sets free the stores of nutritious matters which it envelopes. Some farmers who hold straw in high estimation prefer giving it just as it comes from the field; they base this practice on the belief that ruminants require a bulky and solid food, and that their digestive powers are quite sufficient to effect the solution of all the useful constituents of the straw. It may be quite true that cattle, as asserted, can extract more nutriment out of straw than horses can, but that merely proves the greater power of their digestive organs. No doubt, the food of the ruminants should be bulky; but I am quite sure that cooked or fermented straw is sufficient to satisfy the desire of those animals for quantity in their food. So far as I can learn, all the carefully conducted feed ing experiments to test the value of straw which have been made have yielded results highly favourable to that article. Mr Blundell, in a paper on the 'Use and Abuse of Straw,' read before the Botley (Hampshire) Club, states that in his experience, he found straw to be more economical than its equivalent of roots or oilcake in the feeding of all kinds of cattle. 'I find,' says Mr Blundell, 'that dairy cows in the winter months if fed on large quantities of roots, particularly mangolds and carrots, will refuse to eat straw almost entirely, and become very lean; but they will always eat a full portion of sweet, well-harvested straw, when they get a small and moderate allowance of roots, say, for an ordinary-sized cow, 15 lb. of mangold three times per day, the roots being given whole, just in the state they come from the store heap. Again, calves and yearlings, being fed with roots in the same way, will eat a large quantity of straw; and when they have been kept under cover, I have had them in first-rate condition for many years past. Also, in fattening beasts when they get a fair allowance of roots, say 65 lb. to 70 lb. per day, with from 3 lb. to 4 lb. of cake or meal in admixture, they will eat straw with great avidity, and do well upon it, and make a profit. It is, however, often the case that bullocks receive 100 lb. or upwards of roots per day, with a large quantity of cake or meal, often 10 lb. or 12 lb. per day; they will not then look at straw, and are obliged to be fed with hay. The cost price of these quantities and kinds of foods stands so high, that the animals do not yield a profit, for although they may make meat a little faster, yet the proportionate increase is nothing compared to the increased cost of the feeding materials used.'"

LX. AN IMPLEMENT FOR TURNING MANURE.

I send you a rude drawing (from the *Albany Cultivator*) of a contrivance we have used for turning manure in the cattle yards, and found to be a good thing. In this section we use large quantities of rye straw to litter the yards with during the winter;



this remains in the yards during the summer, and is carted out in the autumn to the next year's planting ground. It is necessary to turn the manure about midsummer, otherwise the top will be quite fine, and the bottom scarcely decayed at all. This work was formerly done with potato forks, and was both slow and laborious. With a concern of this kind, and a good team, it can be done easily, and done well. It is worked by pressing the tines into the manure, drawing it forward a few feet and then backi I think it will be understood without a desc The one we use has a head about 3 feet lor tines are made of ¾-inch rod with a shoulder a so that they can be screwed tight; they exten below the head, and project forward slightly, s hold on to the manure.

LXI. VALUE OF BREWERS' GRAINS AS A FOC MILCH COWS COMPARED WITH RAPE-CA

As in many towns a large supply of brewer can be obtained for feeding purposes, in conj with other food, the following details of an exp made by M. Struckmann in Germany, and as by Dr Voelcker, the eminent agricultural chem be of service. The object in view was of a character—First, to ascertain the weight of l grains necessary to replace the pound weight c cake; and, secondly, to shew the comparativ upon superior and inferior cows of feeding the the same kind or quality, and the same we food :—

Experimental Periods.	Duration of each Experimental Period.	Daily Food per Cow in each Period.	Average Weight per Head.		Dail Avera Yield Milk	
			Superior Cows.	Inferior Cows	Superior Cows.	
			Lb.		Lt.*	
I.	Feb. 22 and Mar. 1	18 lb. Brewers' Grains 36 lb. Mangold 25 lb. Oat Straw	1065 1087	1039 1042	43.6	2
II.	Mar. 19	5.4 lb. Rape-cake 36 lb. Mangold 25 lb. Oat Straw	1097	1072	46.5	3
III.	Mar. 27	4.5 lb. Rape-cake 36 lb. Mangold 25 lb. Oat Straw	1118	1085	43.4	2
IV.	April 5	18 lb. Brewers' Grains 36 lb. Mangold 25 lb. Oat Straw	1112	1118	40.9	2
V.	April 14	18 lb. Brewers' Grains 45 lb. Mangold 25 lb. Oat Straw	1094	1086	37.9	2
VI.		12 lb. Brewers' Grains 45 lb. Mangold 25 lb. Oat Straw	1116	1098	33.9	2

* Litres, 4½ = 1 imperial gallon.

The food which produced the most milk shewn by the above table, 5½ lb. of rape-cake of mangold, and 25 lb. of oat straw. It shews, that 1 lb. of rape-cake produced on an average of milk, and that 1 lb. of brewers' grains p

of milk. Thus 1 lb. of rape-cake is equal
rewers' grain in its milk-producing powers.
-which is a note-worthy point—that while
roduced by the rape-cake was richer in
butter produced by the grains was more
lavour.

HEAD AN INDEX OF THE QUALITY OF FEEDING CATTLE.

an ox and building a barn are two very
erations, depending on principles entirely
Some by their practice appear to think
e quite alike. There is the ready framed
carcase of the animal—to be increased in
grain, and roots are the materials to be
l that is needed is to introduce food, let it
over in the animal's mouth and stomach,
ding will be completed—just as one would
ne carpenter so many timbers, boards, and
d in due time find his barn finished. But
n happens that though grass and grain,
al, are given without stint, the expected
ails to appear; and instead of rich juicy
, packed under a sleek mellow hide, there
coarse, ill-favoured, leggy nondescript,
like a mastodon, and gristle and hide like
. Now, the carpenter has just one thing
ish, and his tools are fitted for it, and
e employ him with a reasonable certainty
k will be done; but an ox carries on more
ude. He not only makes beef, but bones
and hide; besides which, he uses up not
on his own private account for keeping
also keeping up his spirits, that he may
wild vagaries of frisking and restless
d exercising his horns on the neighbouring
his owner's patience at the same time.
ls excel in one of these departments, some
One contentedly chews its cud, while
eeking mischief; one turns his food to fat,
produce little but bone and muscle.
nonsense to give materials for the barn to
right or the cabinet-maker, and it is no
nent to select animals for fattening without
their aptitude for that purpose. All beef
n cattle, but all cattle will not make beef,
vaste of money to feed grain to *bone-mills.*
s were suggested by the following valuable
oice of animals for fattening, contributed
ley to the Newcastle Club, and published
cultural Gazette, England. He says:—
se identification with fat cattle for several
e always found that the best animals have
assive heads, most capacious chests, and
ines. I have, therefore, evolved a few
by in the purchase of lean ones, and
h one exception I have found them to be
The *head* of any of our bovine races
ve the first consideration; this is the true
vital acumen, and even bodily construc-
ill be found to foreshadow all of good or bad that may be accomplished. Thus, an animal possessed of a broad, full, spacious skull, with strong evenly-bent deflective horns, will be found to have a thick neck at the base, wide thorax, and strong nervous system; while one with long, narrow, contracted skull, and puny, abruptly bent horns, will be characterized by weakness, wildness, and slowness to fatten. A small, dull, sunken eye betokens hardness of touch and inaptitude to fatten; and a bright, large, open, soft eye, *vice versa.* A starting, dark, fiery eye often accompanies a small forehead and hereditary wildness, and when combined with small drooping horns, and a chin with no loose skin hanging from it, is a very despicable animal indeed, weak in constitution, predisposed to lung disease, and sterile in fattening propensities. Animals with weakly-formed heads have always small loins, and the width of these parts will always be found in an exact ratio with the strength of the head. The nose, instead of being long and fine, as Virgil, Aristotle, and several other naturalists recommend it, ought in my opinion to be thick, strong, and near the ear as possible, if only in proportion to the size of the frame. Thickness of nose and thickness of chest are often twins, and so are thin, meagre, irregular noses and consumption. Small, snipy noses oft sniff the air into frames of small capacities, and are joined to mouths that can crop but very small morsels at a time. These observations I have found to be applicable to any of the kinds of cattle shewn at Newcastle market. But besides the shapes of animals, the age and class must always have especial consideration, and be adapted according to food and situation; otherwise, the realization of remunerative profits will be uncertain."

LXIII. ARTIFICIAL MANURES FOR THE TURNIP CROP.

The following Notes are taken from a valuable paper by Mr Jacob Wilson, Woodhorn, Norfolk, and although published some time ago, is well worthy of reproduction here, as conveying much information of a valuable character, in connexion with the manuring of that crop which is now so much engrossing the attention of our farmers, and on which we have given remarks in other parts of this journal:—
1. *Sandy Soils*—Including all soils containing more than 80 per cent. of sand; and these may be said to represent the hungry class of soils, inasmuch as they contain an extremely small quantity of the food of plants, and their powers of retaining that food, when supplied, are very limited. They are very porous and liable to drought, from a want of a sufficient supply of alumina. As a rule, on such soils manure should be applied in small quantities, in a soluble form, and for each individual crop, so as to produce a maximum benefit, and prevent a loss. 2. *Calcareous Soils.*—To this class belong that very extensive range of soils incumbent on the limestone formation, but also generally understood to include all soils containing more t n 20 per cent. of lime. Most of them are shallow

easy to work, as on the wolds of Yorkshire and Gloucestershire, and in some cases, where a clay exists above the limestone, they are exceedingly fertile. On the bare and light limestone soils, manures rich in soluble phosphates are most suitable to the turnip crop, for on this light and naturally dry land, often worth only about 15s. per acre, excellent crops are produced by 2 to 3 cwt. of a soluble superphosphate drilled with the "water drill." Guano does not ensure such a regular plant as superphosphate, though swedes that are dressed with the former grow longer in the autumn. Where possible, the application of from 10 to 12 tons per acre of farm-yard manure is desirable, and to the mangold crop it is indispensable, in addition to which I would suggest—for mangold—3 cwt. superphosphate and 2 cwt. guano, with a liberal supply of salt, for it is a gross feeder. 3. *Clay Soils.*—These comprise all soils containing above 50 per cent. of clay; and are mainly distinguished by their stiff and adhesive nature, which is due to the large amount of alumina of which they are composed. Though difficult to cultivate, some of them are extremely fertile, containing inexhaustible stores of the mineral food of plants, especially of the alkalies, which usually occur as double-silicates in conjunction with alumina; they also possess, to a considerable degree, the power of absorbing ammonia and watery vapour from the atmosphere, as well as of retaining the more soluble portions of the mineral constituents of the soil, or a manure without the risk of being wasted; consequently, their productive powers may be said to depend rather on a judicious mechanical cultivation than on the application of manures, which, as a rule, should be applied in a bulky form. Root crops are with difficulty grown on strong soils, unless the latter have received a deep and early ploughing in the autumn, and a subsequent judicious system of spring cultivation, both tending to produce a finely-divided condition of the soil. The liberal application of farm-yard manure in the autumn has mechanically a beneficial effect, though it is a common practice to apply it in a more concentrated form at seed time. For turnips on this land, I still cling to ammoniacal applications, though undoubtedly they are benefited by a small proportion of soluble phosphate, either as a mixture with a special ammoniacal substance, or contained in combination with it in a general manure. I would suggest any one of the following, viz.—3 cwt. guano, or 2 cwt. superphosphate and 1 cwt. sulphate of ammonia, or even 2 cwt. guano and 1 cwt. sulphate of ammonia per acre, of course, with farmyard manure. For mangold and potatoes I would simply increase the carbonaceous matter by an extra supply of dung, and about 4 cwt. guano. 4. *Organic Soils.*—Comprise all soils containing more than 5 or 6 per cent. of vegetable matter, the excess of which is the main cause of their proverbial poverty. On the natural decomposition of this substance, several organic acids, such as ulmic and humic acid, &c., are produced, which are known to be injurious and prejudicial to the cultivated plant; therefore, after drainage, lime will be found an excellent decomposer and purifier, by destroying a large portion of this organic matter, and thus setting free the more useful mineral constituents which it had previously been holding shut up in a useless and injurious condition. Clay or marl, when applied to such extreme cases as soils containing upwards of 50 per cent. of vegetable matter, produces a beneficial influence by increasing its tenacity. For the turnip and mangold crop, 4 cwt. superphosphate and 2 cwt. of salt would be an excellent manuring, in addition to which the physical condition of the soil would be materially improved by eating these crops on by sheep. Potatoes answer well on these soils, and may receive 3 cwt. superphosphate, 1 cwt. guano, and 1 cwt. sulphate of potash. I would suggest, in conjunction with the above, an additional application of a few bushels of bone dust, so as to ensure a take of the subsequent clover crop. 5. *Loamy Soils*—Being those in which the proportion of lime is more than 5 and less than 20 per cent., and that of clay more than 20 and less than 50 per cent. They are composed of clay, lime, sand, and organic matter, in so finely-divided and equally-balanced a condition as to cause them to represent the most fertile soils, and to which the majority of our cultivated crops are suited. They contain a sufficiency of clay to render them good wheat soils, and are, at the same time, of so friable a nature as to be considered among the best turnip soils, whilst the best clover plant is seldom known to fail; they are, therefore, among the highest-rented and most valuable lands in the kingdom. As a class they are usually subdivided into "sandy loams" and "clay loams," the former very closely resembling the sandy soils already alluded to; and may, with a very slight variation, be treated as such; to the latter, of a stronger character, I will now refer. In the event of farm-yard manure having been applied in the autumn, or is to be applied at seed time, for the turnip crop, I should look to a soluble mineral manure as an artificial dressing, either in the shape of a superphosphate or a phosphatic guano. In case no dung is used, I should then add some nitrogenous substance, in a limited quantity. The following mixture would suit the latter case, viz.:—4 cwt. superphosphate and ½ cwt. sulphate of ammonia, or a common mixture used in Scotland, viz., 2 cwt. guano and 3 cwt. superphosphate; but perhaps a more desirable dressing still would be 3 to 4 cwt. of Phospho guano, the results from which in loamy soils being already such as to give us every reason to foresee its more general application to the exclusion of many of the manures at present in use, for it is my opinion that for general purposes it is the best manure as yet introduced. When farm-yard manure is used, 4 cwt. superphosphate will be found enough, though in some cases ½ cwt. sulphate of ammonia may be added. For potatoes I would use 2 cwt. guano and 3 cwt. sulphate of potash, or 4 cwt. guano will be enough in conjunction with farm-yard manure. For mangold 2 cwt. each of guano, uperphosphate, and salt, or 4 cwt. Phospho guano will be an excellent dressing with farm-yard manure.

LXIV. MANURES AND TOP-DRESSINGS FOR GRASS LANDS.

The following lime compost, says Professor Tanner, of Birmingham, is of great value, and will be found especially useful when the land is mossy. To make this compost, the Professor states that the scouring of ditches, road scrapings, weeds, sods, bog earth, and, in fact, any vegetable matter not suitable for the farm-yard manure-heap should be collected and intermixed with lime, fresh from the kilns, and partially laked with water. The proportion of lime to the egetable matter should be one cart-load to three of he refuse matter, if peculiarly rich in vegetable matter ; if poor, the proportion of refuse to the lime may e increased from three to nine cart-loads. The nixed heap may rest for four or six months, then be urned over and well mixed, this being repeated a month before using it. It should be applied at the rate of 30 loads per acre, at the commencement of pring, and after being spread, the land should be dragged, rolled, and bush-harrowed. The same authority gives the following caution in using guano, nitrate f soda, or other nitrogenous manures, as top-dressings or grass lands, which, in too many cases, are rendered seless, if not positively injurious, to the land, by the anner in which it is subsequently dealt with. Being powerful fertilizer, and very quick in action, a rapid rowth of grass follows their employment, and the result is, it thus becomes such a temptation for the cythe that few are able to resist it. The crop is ut, and in proportion as the soil is light in its character, and generous in its nature, it becomes impoverished, and the herbage weakened by the indicious use of a stimulating manure. This does not appen upon stronger and more retentive soils, which re slower in their action, and hence more durable. n the use of these stimulating manures, it should be emembered that they excite the growth of vegetation such a manner that not only is the manure which as been applied taken up, but it *stimulates* the plant fresh energy in the search of food from other ources, the soil and the atmosphere. If, therefore, e crop were consumed upon the land, its fertility ould be very much increased, and a future crop ight be removed with far less injury to the land ; ut this is seldom done, and hence guano and similar anures are often condemned as injurious to the quality the herbage after the first effect has passed off. The mbined use of superphosphate of lime with the ano, is far preferable to the use of the latter alone. here farm-yard dung cannot be obtained, the follow- composts and manures are recommended by a actical authority :—Near towns, where dung may purchased—Manures, 3 tons ; earth, 3 tons ; comn salt, 1 cwt. This should be well mixed and ned, and well watered with liquid manure. Where shoddy can be obtained, but manure cannot—Shoddy, 1 ton ; earth, 3 tons ; bone-ash, 1 cwt. ; common salt, 1 cwt. ; sulphate of magnesia, ½ cwt. ; mixed, well watered, and turned twice. Where soot is easily available—Soot, 8 cwt., or 32 bush. ; earth, 3 tons ; bone-ash 1 cwt.; sulphate of magnesia, ½ cwt. ; mixed and turned once. Guano may be employed in the following economical and efficient mixture—best Peruvian guano, 2½ cwt. ; common salt, 1 cwt ; sulphate of magnesia, ½ cwt. ; earth, 1 ton. Rape-dust may be used economically, and for a change efficiently, thus—rape dust, 5 cwt. ; common salt, 1 cwt. ; earth, 3 tons.

LXV. THE DRYING OF HOPS.

The hop-kiln or oats-house is constructed to act much on the same principle as the malt-kiln, with some trifling difference in the details. But the same difficulty of regulating the degree of heat, and the amount and rapidity of drying, is met with as in the malt-kiln ; only, probably, the difficulties are greater in the case of hops, especially in the first stages of drying, from the dense mass presented by the damp leaves of the plant exposed to the drying. This density brings about frequently an overheating of the hops in the first stages of drying, which is the cause of much deterioration in the brewing value of the hop, arising mainly from the high temperature causing a portion of the volatile or essential oil of the plant to be relieved and to escape. It is well known that hops, dried in a way which approaches the natural way of drying in the sun-heat, possess better brewing qualities than those dried in the hop-kilns with all their irregularity of heating. In Bavaria, for example, the hops are either dried in the sun, or placed in lofts and garrets immediately below the tiles or slates. There is another deteriorating influence, moreover, at work in the ordinary hop-kilns—namely, the effect of the impure gases from the furnace. We have little doubt, therefore, that the system of drying hops by forcing currents of *pure* heated air is the only way by which their brewing qualities can be best retained. By the use of apparatus, in which steam is the heating medium, air of *absolutely pure* quality can be obtained, and this of any required temperature, and the quantity or amount of which passed through the mass in any given time can be regulated to any degree of nicety. One advantage obtainable by the use of this apparatus, and which it is difficult to obtain with the ordinary kiln, is that during the first stages of drying, when the hops lie in a damp dense mass upon the " hairs," the degree of temperature can then be lower, regulated, indeed, exactly as required ; and this gradually raised as the hops get lighter, when the process of drying will be finished off by the use of the highest degree of temperature thought necessary. It should always be remembered that in the drying of all substances—but more especially in those which are used in such a way that they impart a flavour to decoctions, or by mixi with other materials, as malt and hops—*the tr* *flavour can only be secured by retaining those chemical qualities which impart this flavour*, and that this cannot be done when we place the substances under circumstances in which a change is brought about in their constituents ; such as must be done, for example, to a great extent in the ordinary hop-kiln, where they are subjected to impure heated air and irregular drying. Let the air be pure, and let the passage of this through the mass be uniformly steady, so as to carry off the vapour &c., evolved from the mass as soon as it is formed. Secure these ends, and regulate the temperature of the air according to the stages of the operation, and good hops not "hayed," but possessing the maximum of "brewing" qualities, will be obtained.

LXVI. LAID CORN CROPS.

Laid corn is generally attributed to over-manuring, especially in the case of barley ; but when it obviously does not proceed from this cause, agriculturists are divided in opinion as to what it really is. Some maintain that it arises from the absence of certain mineral elements in the soil, such as soluble silex ; others, through growing too frequently the crop upon the same land. Some attribute it to atmospheric influences ; but, considering that this question of great agricultural interest might be elucidated by science, a continental authority experimented upon the subject, and as the result of the experiments, offered to farmers a very simple cure, and one very easily carried out, to prevent the corn being laid. This consists in sowing a field, not as one does generally, with one kind of corn, but with a mixture of several varieties of corn. M. Biard mentions, to support his system, very conclusive experiments, and affirms, moreover, that the crop of mixed wheat has been very superior, as well in straw as in seeds, to that even of corn sown separately. The mixture, to obtain the result sought, ought to be composed of corn having short and long stalks.

LXVII. ON THE ECONOMIZATION OF FEEDING-STUFFS.

The following notes, culled from various sources, will be useful. The first we give is on the rape-cake, which will be supplementary to what has been given in Note LXI. Rape-cake possesses many advantages ; it is much cheaper than the linseed-cake, while its feeding capabilities are equal to it. Wolff has proved that in feeding it is more than equivalent to twice its own weight of hay ; and in milk-producing qualities, 1 lb. of rape-cake will produce 1½ lb. of milk, as shown in the above Note. Dr Voelcker gives the following statement as to the feeding value of rape-cake compared with linseed-cake :—

	Linseed.	Rape-cake.
Moisture, ...	12.44	10.68
Oil, ...	12.79	11.10
Nitrogenized flesh-formers,	27.28	29.53
Heat-giving substances, .	41.36	40.90
Mineral matters, . .	6.17	7.79

great objection urged against its use is the dislike which cattle have for it. To accustom them
Dr Anderson recommends the bulky food, as
and straw, to be diminished in quantity, repla
by some substance, as grain, containing in
bulk the same amount of nutriment ; then
craving for a sufficient quantity to fill the st
will induce the animals to consume the rap
after a few days they become completely accu
to it." Where rape-cake is used in conjunctio
other food, and steamed or cooked, it is wo
observation that if it (the rape-cake) is treate
boiling water, or the mixture heated beyond the
point, all acridity disappears, and the animals e
avidity. Mr C. Lawrence of Cirencester, w
first to notice this—at least to draw public atten
it, and on his representation Dr Voelcker c
examined some rape-cake, and furnished the fol
report :—"I believe the pungent principle ir
cake arises from the presence of mustard seed,
is often contained in considerable quantities in
rape-cake. Mustard and rape seed belong
same family of plants, and in Germany, at leas
sorry to say, our rape fields are often very fo
mustard. That boiling water prevents the
acrid smell, is fully explained by the chem
mustard-seed. That seed does not contain any
or essential oil of mustard, the cause of the pu
of mustard taste ; but it does contain two
principles, which, in contact with cold or tepid
generate essential oil of mustard : the one is c
chemists 'myronic acid,' the other 'myron.
latter is a substance like albumen, and, when mc
with cold water, acts as a kind of ferment upon
acid, producing the acrid oil of mustard ;
boiling water coagulates myron like albumen
coagulated state, myron loses its efficiency a
ment, and consequently no pungent or acrid smel
duced when cake containing mustard is mixed in
water." On the value of potatoes used as compa
turnips, and of the mode of feeding with a v
food, we give the following from an e
authority :—"I think there is fully more
material per acre in an average crop of pota
in beans and peas, than in turnips, though I a
latter are grown at less expense. My experi
led me to the conclusion that the largest pro
tained by feeding with a mixture of all thre
It has been calculated that an ox in good
condition will lay on one pound of beef for ev
of turnips he consumes. Of course this varie
is very near the truth. I may remark here
supply of good fodder is absolutely necessar
improvement of all cattle when feeding. Th
ence betwixt the cost of cattle, when one
is supplied with good oat straw and the ot
coarse wheat straw, is most marked. The fac
will not eat coarse straw, or at least enough
they gorge themselves with turnips, which
them to scour. As on many farms it is di
have a supply of good fodder at all times, I m

an I adopt, which is to allow daily all feed-
: or 2 lb. of meal made from grey corn of
iption, and sometimes bean meal. This is
vith a large quantity of chopped straw or
f, and allowed to soak in water for twelve
hen the animals are fed in the morning, the
led to be ready for the evening. A handful
alt is sprinkled among the feed, and it is
aten, and renders the animals almost inde-
straw. This is the way I almost invariably
to cattle, and for feeding animals it is a
cheaper plan than pulping the roots and
m with straw. I have already stated that
urnips produces 1 lb. of beef. The late
n, in his report on feeding cattle, printed
th volume of the *Transactions* of the High-
y (new series) states that it took nearly
urnips for every additional pound of live
animals made, while less than 39 lb. of
oduced the same result. I will assume the
to be as four is to ten, and I contend that
otatoes are as easily grown as 10 tons of
The chief thing against the potatoes is the
seed; but, on the other hand, there is less
h potatoes, and you can have a crop of
at in place of barley, as must generally be
r turnips. But when you feed with a
the two roots, you enhance the value of
the animals make greater and more rapid
an when confined to either singly. With
one-meal, I am not sure that it has been
tely ascertained how much of it is required
1 lb. of beef. My own experience leads
ve it takes nearly 7 lb., or say 9 lb., of beef
, which gives 72 lb. of beef per qr. of
seed-cake makes a better finish for animals
meal; they handle more nicely, and have a
y coat. Bean-meal makes a better tallowed
e linseed-cake lays the fat more on the out-
en potatoes and beans are used along with
feeding stock, the account for linseed-cake
nparatively small, and there is a certainty
e using an article with which no adultera-
een attempted; at the same time, I have
d the free use of linseed-cake to pay hand-
the last six weeks or two months of

WROUGHT-IRON FENCES—SETTING IRON FENCE POSTS.

iron fence we ever saw was set up between
xty years ago. It was entirely of wrought-iron, and cost much labour and money. For many years only wrought-iron was used in the construction of fences, railings, balustrades, &c.—at least in this country; and even now a neater, lighter, less costly, and more durable fence can be made of wrought-iron than of cast-iron. The latter may be made in more elaborate forms, but the fragile character of cast-iron as compared with wrought-iron makes the latter preferable in this climate. A very neat wrought-iron fence may be built by any blacksmith with but little forging. The lower and upper rails may be of flat bar iron, 3-8ths by 1¼ inches, or heavier if desired. These should be drilled or punched with holes at equal distance apart, from 2 to 4 inches. Then take round iron and bend it in the form of an arch, either Gothic or semi-circular, and pass the ends through the top and bottom rails, rivetting the ends in the lower rail, or furnishing each end with a nut. When the sizes of the round iron vary, and the arches are made concentric, the effect is very fine. For instance, let the holes in the rails be made 4 inches apart and there be three arches; the outer one may be made of half-inch round iron, the span of the arch being 20 inches. The next may be made of 7-16th or 3-8ths iron, with a span of 16 inches, and the inner arch of 3-8ths or quarter inch iron, with a span of 4 inches. The fence will be very neat and elegant. The arches may be bent cold, and the holes may be drilled on a common foot-lathe, so that the fence may be made and put up by any one without the aid of steam or water power. The posts are merely uprights of iron similar to the rails, and they are fastened into stone pedestals in the usual way, the fence being strengthened by diagonal braces at proper intervals. Iron fences are usually set on stone foundations, although some have iron bases, which, when the posts are secured to the bases by bolts, appears to be fully equal, if not superior, to fences resting on stone foundations. Melted lead is commonly used to fasten the iron to the stone, and, so far as our experience and observation extend, is better than anything else. Brimstone cannot be tamped, and it is unhandy to use, as it cannot be remelted without becoming viscid and refusing to run freely. Besides, it will absorb moisture, and combining with the iron, it deteriorates the latter rapidly. Nor is lead entirely harmless in contact with iron; atmospheric air or water will oxydize the iron. The only protection is a coat of paint to exclude all moisture. A cheap, durable and effective cement for securing wrought and cast-iron work to stone would prove a fortune to its inventor.

Our Library Table.

On Heavy Road-Rollers for Turnpike Roads, being a Report by a Committee appointed by the Commissioners of Supply of the County of Berwick. William Blackwood & Sons, Edinburgh and London. 1869.

ALTHOUGH both branches of the Legislature manifested their approval of the principle of road-rolling by several acts, passed so far back as 1816, wherein tollage exemptions or modifications were granted, with the view of promoting the use of broad wheels for waggons and carts, which, in the language of that celebrated road improver, Mr John Loudon M'Adam, "must rather be advantageous to a well-made road, upon the principle of the roller," yet we find, from the evidence of Mr William Horne, "a proprietor of many mail and stage coaches," given before a select committee of the House of Commons in 1819, the road-roller is stated to be a late invention, and that it had been used very successfully for improving the north-east road (the way that the Edinburgh mail comes into London). Since that time road-rolling has had many advocates; and road-rollers have been owned by a considerable number of road trusts, as well as by some enterprising landowners. But it must be admitted that these road-rollers have been too generally laid aside, after being imperfectly or unfairly tried; and looked upon as cumberous monstrosities, incapable of compensating for the trouble and expense of working them, unless in some rare and unexceptional cases. Many causes may have combined in producing this abandonment or neglect of these ponderous and costly implements, but the two principal ones have undoubtedly been their improper construction, and the waste of horse power incurred in the working of them; both of which have recently been entirely, or, at least, in a great measure, obviated.

Until lately, the road-roller has been a huge cast-iron cylinder, with a box or boxes mounted on the frame-work, to hold pig-iron, stones, earth, sand, or other materials for increasing the weight—a highly objectionable mode of doing so, as these must be borne entirely by the axle, consequently the friction becomes increased, and the draught thereby impeded, proportionately as the weight is increased, which objections have now been obviated by means of the water-weighted roller, consisting of a close ended iron cylinder, filled with water according to the weight required when in use, and emptied when being transported from place to place. The most perfect of these water-weighted rollers are further furnished with appliances by which the draught can be reversed without turning them.

The diminution of friction consequent upon the adoption of water for increasing the weight, not only lessens the tear and wear of the roller, but largely diminishes the horse draught. Steam-power is now, however, made to supersede horse-draught in working the heaviest and most effective road-rollers, although horse-power is still preferred by many for the smaller class of rollers, which can be easily wrought with six horses, but where eight or more are required, horses cannot be got to work well or pull fairly together, and the chances of their suffering from accident or injury are very much increased.

Both horse and steam road-rollers are now successfully employed in France and Prussia, as well as in some of the most populous districts of England, such as in and near London and Liverpool. Berwickshire has taken the lead among our rural or landward counties in testing the advantages of road-rolling; and that the landed proprietors in that county have set about the matter with praiseworthy energy and zeal is shewn by a recently-published report, from which it appears that on the 6th of October last David Robertson, Esq., M.P., of Ladykirk, called the attention of the Commissioners of Supply and Justices of Peace for the county to the importance of having a heavy roller for the purpose of consolidating the metal used for the public roads. In compliance with his proposal, a committee was appointed to obtain information on the subject, which committee, under the convenership of David Miln Home, Esq., of Wedderburn, immediately took steps to seek for the information wanted, by corresponding with road surveyors both at home and abroad who had acquired personal experience of road-rollers. A considerable amount of information has been thus obtained, which the committee have classified under the following four heads:—1. Alleged advantages of road-rollers. 2. Kind of rollers most recommended, and cost thereof. 3. Calculation of expense in using roller. 4. How a roller may be got for Berwickshire.

Under the first of these heads eight letters and documents are given, in which, from experience with horse-rollers, loaded with water up to 7 tons, and steam-rollers, weighing from 20 to 30 tons, a saving of twenty to fifty per cent. on the cost of road-keeping is claimed, while the entire surface is rendered so hard and smooth, that those dangerous incumbrances, road tressels, are entirely dispensed with, and the draught on the horses very materially lessened.

the kind of rollers most recommended,
given to the steam rollers where the
y, but on country roads, where the traffic
rse rollers, loaded more or less with
ding as circumstances may direct, are
le of producing the desired results; and
advantage of costing only about £160,
the others is stated at £1000 to £1200,
ree or four turns of the latter, will, how-
ly suffice to roll in a newly metalled road
, that a loaded cart may be drawn over
ithout leaving the impress of its wheel
from fifteen to twenty turns of a horse
needed to produce the same result.

rules strictly enjoined by Mr M'Adam
very road is to be made of broken stone,
ure of earth, clay, chalk, or any other
ill imbibe water, or be affected with frost.
be laid on the clean stone on pretence of
oken stone will combine by its own angles
, solid surface, that cannot be affected
s of weather, or displaced by the action
This we have always looked upon as an
on, advanced by that eminent engineer, and
have frequently seen ignored in practice
neficial results, even on some much fre-
country roads, where the surface was
o be injuriously affected by frost and vi-
weather. The hard, bare metal is not
rtful to the horses' feet, but it actually
s consolidated until the stones are wasted
eir angular parts ground off, through the
on of cart and carriage wheels, and formed
ing material; or until these, by the aid
er, actually mix and consolidate the metal
terial which is prohibited in the above
m being artificially and promiscuously
Ve are not, therefore, surprised to
e practised road surveyors, who have
e Berwickshire committee with reports,
ommending newly laid road metal to
ith good "hogging," as the binding materials are technically called by engineers. A correspondent at Coblentz mentions that there three different beds of metal are laid down for a new road—the first, 3 inches; the second, 2 inches; and the third, 1 to 1½ inch thick. Before the second and third beds are laid, a horse-roller, loaded with water to 6 tons, is used to consolidate the first bed, and each bed is well sprinkled with earth and water. The roller, in finishing, is so often drawn over the metal, "that a loaded cart will not leave marks with its wheels on the road."

At the conclusion of this full and explicit Report, which was drawn up by the convener, the committee, in recording their opinions, state, among others of mere local import—1st, That by using a heavy roller to consolidate metal when laid on the roads a smooth and hard surface is obtained at once, whereas by the existing system, the road remains rough and soft for weeks or months, according to traffic; 2d, That by obtaining a hard and smooth road at once, the following advantages accrue:—1. *To the Public.*—By saving wear and tear of carriage and cart wheels; by lessening the risk of horses stumbling; by enabling horses and vehicles to go at greater speed; by facilitating the travelling of farm stock; by diminishing interruption on the roads, arising from frequent renewing of metal, and from placing tressels or large stones thereon, which, moreover, sometimes cause accidents. 2. *To Road Trust Funds.*—By a smaller quantity of road metal being required; by a smaller number of surfacemen being employed; by saving the purchase of tressels and mud-scrapers.

The public in general, and road trustees in particular, are much indebted to the Berwickshire Commissioners of Supply and their committee, for getting together, and publishing, at a mere nominal price, such a mass of really useful matter as this report contains; and that more especially at the present time, when the clearing off of trust debts and toll-bars, as well as the cheaper and better maintenance of our public roads, are subjects commanding almost universal attention.

The Garden.

THE SUBURBAN AND AMATEUR'S GARDEN.

CHAP. IX.

ROCKERIES, AND HOW TO BUILD THEM.

NO rock-work may be said to be complete without the introduction less or more of Sedums, Saxifrages, and Sempervivums. These are the proper plants for covering stones, rocks, roofs of houses, and walls. Once fairly launched into a growing state, they increase and form beautiful tufts for individual inspection, among the stones, the boulders, the clinkers, and the scoriæ that make up the face of the rockery. It would be no small work to attempt to name all the species that might be used for that sort of purpose, and which are to be found in numbers growing indigenous in our climate, and also the selected sorts that the alpine culturist tends with unwearied care. It shall be our object to name a few that are particularly suitable for the city and suburban amateur.

Among Sedums not having yellow flowers, the first that should be obtained is S. rhodiola. It grows to a considerable size, and is found in all the alpine regions where perpetual snow does not exist. In fact, the Greenlanders use it as an article of diet. S. Aizoon is another capital plant. It is a native of Siberia, and flowers in autumn. In white flowered stone crops and flat leaves we have S. oppositifolium, a native of the Caucasus, and a fine plant for rock work. Then there is S. tetraphyllum, or the four-leaved stone crop, a good grower, and having conspicuous flowers, with a red keel on the white petals. To these might be added the house-leek-like stone crop (S. sempervivum), a very fine flowering plant, with large purple flowers; and the dwarfer Iberian variety (S. Ibericum), with flowers of a reddish colour and flat leaves. The more interesting of the tribe for the choice spots of the rockery are species having terete leaves-
leaves like a taper, round and lo
Hungarian S. glaucum is a fine
dwarf variety, and the slender ston
gracile, which is a purely alpine spec
ing many thousand feet above the le
sea, and delighting in spreading it
rocks where there is a crevice for
to penetrate. The purplish-flower
crops have no finer, although a
representative than S. cœruleum.
originally found at Tunis, growin
fissures of rocks, and it flowers in
August, and can be sown every yea
an annual—indeed, most of the red
kinds are annuals. The best so
yellow flowers for the purpose we
ested in are S. rupestre, particularl
for rockeries, and S. sexangulare, b
being perennials, the latter species
our own native S. acre, which is fo
an excellent medicine in all scorbu

Saxifrages are far more nume
than stone crops, and must be pl
some order of selection, else the
would be characteristic of too m
ness. It is impossible to find a
will thrive better in sufferance
"None-so-pretty" or "London
properly speaking, shady saxifrage
umbrosa). It is reckoned by som
ing, or indigenous to this count
rather incline to the supposition th
have been some seed that has a
been scattered, and that its true n
is the Pyrennees. The cymba
saxifrage (Saxifraga cymbalaria), i
nial and a distinct plant, with kid
leaves and small golden flowers,
hailing from the Levant. The gran
saxifrage (S. granulata), which is

in almost every garden, although a perennial indigenous plant, is well suited for transferring to the rock work, and is distinct with its hairy reniform leaves. The opposite-leaved saxifrage (S. oppositifolia) is a British plant, with imbricated leaves and fine lilac coloured flowers, coming into beauty in early spring, and well worthy of cultivation. The only other variety that we will name is the pyramidal saxifrage (S. Cotyledon). It is a most conspicuous flowering plant, growing on the Alps of Switzerland and on the Pyrenees, and yields great branching panicles of a white inflorescence throughout early summer.

The house leeks are well named Sempervivum, for the tenacity with which they hold on to life is well known; and every one must have noticed how the common house leek is often exposed to the rigours of climate; whether it be an unprecedented cold in winter, or an unprecedented drought in summer, still it may be seen on the old thatch or tile housetops almost bidding defiance to privation. No better certificate is needed for transferring them to the city rockeries, as likely not easily to succumb, however inattentive the party in charge may be. The botanical name of the common variety is S. tectorum. It is well known all over the Continent, and is generally employed for a variety of decorative purposes. In Germany it is popularly called "hauswurz," in France "la grande joubarbe," and in Italy "sempervive maggiore." There are about a score of species, but the common one is sufficient for the purpose of the amateur. If more be wanted, there is S. arachnoideum, a very good alpine species with purple flowers, and S. retusum, a native of Teneriffe, and well adapted for covering rock and stones.

Such miscellaneous plants as the following come in with much grace:—An occasional foxglove (digitalis), the purple-flowered and deltoid-leaved aubrietia (A. deltoidea purpurea), the variegated wall cress (Arabis variegata), patches of "Snow in Summer" (Cerastium tomentosum), hepaticas of sorts, both single and double, which are a hardy race, the dog-tooth violet (Erythronium dens canis); some of the dwarf trailing phloxes, such as the subulate-leaved American variety (P. subulata), having the most beautiful pink flowers, with a permanent star at the base of each; the procumbent phloxes (P. procumbens) from North America; the setaceous-leaved species (P. setacea), somewhat akin to P. subulata; the basil-like soapwort (Saponaria ocymoides) from the Continent, which delights to nestle on the quiet retreats, and cover with cushion-like masses of foliage any rock work; and several others.

All the plants named prefer a good fresh compost. Whatever the foundation work of the cairns and mounds may be, at least 9 inches of the upper stratum ought to be selected soil. The best kind suitable for all purposes is a good free unctuous loam, and peat soil and leaf mould, in the proportion of equal parts of the former to that of the latter. Peaty soil, if good, generally contains a sprinkling of sand, and it is of great importance and value as a conservative and corrective medium. White sand is best for mixing with it, but the gritty sand of the quarries makes a very good substitute. As a rule, rather have a greater than a lesser proportion of sand. A very good medium is about a sixth part of the whole selected compost. Some of the grosser growing plants will send their roots under the stratum into the colder and probably clammier substratum, but that is of no consequence. The great object is in providing the proper kind of food for the beautiful dwarfs that carpet the face of the rockery. It is almost needless to advise that the stones should be partly buried in the soil, so as to provide a better groundwork for the selected ferns and miscellaneous plants.

CHAP. X. HOW TO MAKE UP A HOT-BED.

The mere mechanical operations of a gardener do not call for much application of scientific thought. Of course they can be conducted neatly or slovenly, according as order may be developed in different individuals. There are other operations, however, that involve chemical changes, as we have endeavoured to set forth in the preparation of soils, that may be fairly considered as scientific processes. Not the least important for the great body of the flower-loving and flower-growing people, is a correct knowledge of how to make up a hot-bed, so as it may the most effectually serve the purpose for which it was intended.

Vague notions are current upon a matter apparently so small as this. It has been ever and anon considered that, given a cart of stable-yard manure, no preparation was essential towards, in the first place, controlling and husbanding the heat, but just the simple putting the material into the form of a parallelogram to fit the garden frame, which was to be the protection of the embryo seedlings until they gained strength and the season advances, so as they could live and thrive under the canopy of heaven. Again, most amateurs, partly from want of consideration, and partly from the gratuitous advice of those who ought to know better, but don't, never think of procuring any other article but the stable litter, although some other heaps may be within their reach at one tithe of the cost.

There is, first, the *leaves* of trees, which, when collected and kept in a compact heap from the time of leaf-fall to the budding and bursting of a new foliaceous race, maintain and give out a steady heat highly favourable to the germination of seeds. The best kinds of leaves for duration are the oak and the beech. The other representatives of the forest yield leaves of a grosser texture, which soon decay, and although useful enough for mixing with stable litter, and even at a pinch may be used on their own account, are not such as we would recommend for selection. Moreover, leaves so used, after they have fairly served the purpose for which they were first ntended, make a valuable compost. The roots of all plants feed and propagate largely on the ingredients of which the decayed compost is composed, and particularly does it form one of the best mixtures for choice pot plants, and for equally choice subjects in the parterre and the flower border.

Again tanners' bark, when put into a heap or square of some size, keeps up a heat both steady and prolonged. In that latter respect it is infinitely superior to stable litter, or even to leaves; and where the latter mentioned ingredients cannot easily be procured, no one need hesitate about ordering a couple of carts of bark. While, however, it has the advantage of maintaining a steady heat for a long period, it has the obvious disadvantage of creating a race of fungi which often prove hostile to the plants. During the ordinary run of from six to eight weeks of the rearing and nursing the seedlings, the material has not assumed that process of decomposition that may be considered favourable to the growth and propagation of fungi, and therefore the annuals are virtually safe, because transferred to their summer quarters prior to the hostile raid of these mycological subjects. It is only such things as pot plants—for example, fuchsias, geraniums, and balsams, that may be nursed up afterwards—whose roots are attacked. Failing, therefore, better fare, the tanners' bark will be found to serve the purpose of germinating and nursing seedlings up to the planting-out period. It is not advisable to spread this tan upon the garden soil unless it be a very retentive clay, and then lime had better be introduced in fair proportion to operate upon any mycelium that may be lurking upon the decayed or decomposing bark.

Then there is cut grass, which, although not come-atable in the early season, will be found valuable for linings. These linings, so-called, are layers all round the bed, to create an additional bottom-heat, where frames are placed on exposed masses of fermenting material. Moreover, there are the herbaceous shoots which have been cut off the plants during summer and autumn, and all the other litter of a likely kind to create heat, which, although not of themselves sufficient to give out the necessary amount, may be well called in as helps; and then there is no better mode of lumping the whole together, so as in the end to be more beneficial, as stimulating or nursing ingredients for promoting plant life and health.

What, however, is of paramount importance, and is generally ignored, is the position of these solid parallelograms of fermenting material. Is it not a suggestive question, How can heat, after it has been created, be best conserved? Certainly not by, as is commonly done, placing the foundation of the beds on a level with the surface, but by digging a pit and sinking them into it, so that instead of the bottom of the bed being kept on a level with the ground, its surface ought so to be. By this mode the artificial heat will remain unspent for at least half as long again a period; and is not this an economy of a kind that ought at once to be looked upon as a golden rule of practice, and acted upon by all? It is an economy truly, not only in point of conserving heat, but conserving the manurial properties of the ingredients, being the best antidote practicable against ammonia being needlessly and wastefully evaporated in the surrounding atmosphere; and, moreover, a considerable less per-centage of material will serve the same growing articles, because in the sunken pits the frame can rest on the very ledge of the fermenting matter, whereas, if raised above the level of the ground, there must at least be 6 inches to spare all round.

Preparation must come in for a share of forethought. It will never do to build up heaps of manure without properly mixing and turning, as heat, instead of being regular, will come by fits and starts, and probably scald the seeds and the seedlings, if ever they reach to that stage. As was said above, scalding vapour must be provided against. If litter be too dry, then watering is an object, and, if possible, some protection must be given it, so as not to be too wet. In the one case, it will not act its part cleverly; in the other, it is a sudden gust of heat, soon extinguished. Then, again, every amateur ought to be sufficiently "posted up" upon this point, that the more regular the layers of manure or other material are laid on and beaten with the dung-fork, the more regular and steady will be the heat; and then, again, when subsidence takes place, as take place it always does contemporaneously with decomposition, it will also be regular in its action. Nothing is more hurtful to the eye and seedlings than irregular depressions and knolls over the surface which the frame encloses, and when watering takes place, water always seeks the lowest point, so that the one batch may be all but starved, the other all but waterlogged.

By a little judgment and forethought exercised at the first, these portentous ills may be avoided.

BEDDING PELARGONIUMS.

LAST season having been one of the most trying for bedding plants that has been experienced for many years, in consequence of its long-continued drought and intense heat, the following short account of such bedding materials in the way of geraniums as have proved acquisitions under such unusual circumstances, may be useful both to gardeners and amateurs.

GOLDEN TRICOLORS.

Varieties belonging to this class, I need hardly say, have the edges of their leaves yellow, backed up by scarlet, dark or black zones, and the disc or centre green. The following present a charming variety, especially as regards the brilliancy and density of the zones or markings with which their leaves are ornamented :—

Louise Smith.—This is a free growing kind, and the pale green which predominates in its foliage renders it very effective. For bedding purposes it is certainly one of the best.

Mrs Pollock.—This, the first really good golden tricolor, maintains its position in the first rank, both as respects colour and growth, and, being cheap, continues to be in great demand.

Sophia Damaresque.—In this variety, Mrs Pollock. fine as she must be admitted to be, has a formidable rival, which, being a more vigorous grower, will doubtless some day supersede her; and, having this much, I need scarcely add that it is one of the very best in its class.

Sunset.—This very distinct and useful variety was very effective here last season, the bright weather which prevailed during summer and autumn fully developing the brilliancy of its colouring. In habit, it is somewhat straggling, a fault which is improved by pinching off the ends of the shoots.

Lucy Grieve.—This is a perfect gem, and, when plentiful, cannot fail to be regarded as a grand acquisition.

Queen Victoria (Perkins).—This succeeded admirably here last season, and is a decided acquisition, the colours being very bright and attractive.

Golden Pheasant.—Very useful, being one of the best of growers, and also a free flowering variety.

Sophia Cusack.—In the way of Mrs Pollock; bright in colours and free in growth.

Lady Cullum.—Distinct, and a good grower; quite an acquisition.

Edwinia Fitzpatrick.—Similar to Mrs Pollock.

Queen of Tricolors.—One of the best of its class, and one on which flowers are produced in abundance,

Beauty of Huntroyde.—Quite a distinct variety, and a vigorous grower.

Mrs Benyon.—Similar to Mrs Pollock, but a free-blooming variety.

Florence.—Very distinct, dwarf, and effective.

Aurora Borealis.—Free and vigorous; an improvement on Sunset.

To the above may be added Sunray and Retaliator, which, although as yet not grown here, are two of the best of the golden tricolor section; also Charles Dickens, dwarf, compact, and free; Earl of Derby and King, both truly splendid sorts. Concerning others I must, for the present, be silent, not having met with them in my wanderings, or having had an oportunity of trying them as bedders.

SILVER TRICOLORS.

Varieties in this class are neither so numerous nor so effective as those in the golden section. The following are the best for bedding purposes that have come under my notice :—

Glen Eyre Beauty.—This was the best here last eason, the red markings on the white foliage and dark zone being very effective.

Italia Unita.—A bad grower, but when planted hickly very attractive and effective.

Silver Star.—Compact, and a good grower.

Caroline Longfield. — An improvement on Italia Unita; one of the best.

Beauty of Guestwick.—Free and good.

Burning Bush.—Though old, still very effective, and certainly one of the best here last year.

Mrs R. Wynn.—Distinct and good; zone brown, laced with rose; flowers rosy carmine.

Countess.—Large-leaved, and free in growth.

Picturatum.—A free grower, profuse bloome captivating variety during hot seasons; the pl light and shade for which it is remarkable ha striking effect.

Queen Victoria.—One of the best; certai acquisition.

Sultana.—Free in growth, compact in habi among bedding sorts, one of the best.

Although among the above are some known kinds, yet all are good, and no tion could be considered complete w them.

GOLD AND BRONZE BICOLORS.

This class will essentially eclipse t colors for bedding purposes, and i some of them are already superior to and are very effective. These bicolors golden yellow centres, and edges of th colours, with more or less red, bron brown zones.

Kentish Hero.—In this the colours are very a strong grower, and fine bedder.

Luna.—One of the best of the old varieties.

Beauty of Caulderdale.—This variety has broad zone; it is a fair grower, and distinct.

Nonsuch.—In the way of Luna; deep zone bloomer and a splendid bedder.

Gaiety.—This variety has a deep bronze zo yellow ground. It is a free grower and bloom is one of the best bedders here, where it is admired.

Compactum. — A decided improvement Beauty of Oulton. Good bedder.

Model.—Flowers cerise, very fine, and dwar

Perilla.—This is a very attractive variety, h deep broad zone; it is a vigorous grower, bloomer, and is altogether a desirable variety.

Ebon.—One of the very best; beautiful z habit; excellent in all respects.

Egyptian Queen.—This variety was far sup regards colour in the north, to what I saw Battersea Park, and it is a good grower.

Beauty, like Luna, is one of the best bedde

Princess of Wales.—Very deep, and for sma one of the best.

Duke of Edinburgh.—A very effective, variety, dwarf habit, vigorous in growth, an pact.

Arthur H. Wills.—Dark chestnut zone, cen bright and good.

Autumn.—Indeed, from what little I have this variety, I believe it to be very superior for purposes.

t Kellie.—As a bedder, one of the best in l.

7. Henderson.—Vigorous and compact, our well, distinct and beautiful.

llce.—This is a fine bedding variety, so attractive as some of the above.

LE-FLOWERED PELARGONIUMS.

is now very popular class I have uch experience; therefore, I merely hose I have proved to be good.

Lemoine.—A beautiful rose-coloured, very ss, habit good; one of the gems of the

m Thumb.—Similar in habit to the Gene- nd dark scarlet flowers, free bloomer, and good bedder.

de Thumesnil.—Flowers very large, free lour orange scarlet; one of the best.

Nancy.—This did exceedingly well last e plants were plunged, with their pots, s. Very good.

—Immense truss; extra fine. This I lded, but I have seen it in a pot. Flowers

NOSEGAY SECTION.

s we are indebted to the late Mr eaton, who was one of the most of hybridizers of pelargoniums; e may say he was the founder of y section. In the third class, we e of the most charming colours, d continuous bloomers that can be the whole race of pelargoniums. ing are a few of the most distinct ful:—

f Sutherland.—The best of its colour; should be grown by every one.

'earson).—This is, without doubt, one of rgoniums in existence; dark; similar in aton's Black Dwarf.

llow.—One of the most effective bedders berton; quite distinct in colour from all rf, and very good.

stance Grosvenor.—An improvement on ne.

uit.—Something similar to the above; very tive.

Seedling.—An improvement on Stella; in colour, and very fine.

—Immense truss, crimson, scarlet shaded,

.—Rose, large truss, deep and fine.

Nosegays.—Orange scarlet, large and fine.

erston.—One of the best old varieties in

Lord Derby.—A most splendid truss; one of the very best; not a distinct Nosegay.

Felix.—Pink; very free bloomer; good habit.

Violet Hill Nosegay.—Very fine dwarf variety, and continuous bloomer; colour, purple rose.

Alexander.—The finest pink pelargonium known; free, and almost a continuous bloomer; fine.

Morning Star.—An improvement on Stella.

There are so many varieties of Nosegays, semi-Nosegays, and Zonales offered to the public every season, that it is impossible for private growers to try one half of them. I buy annually at least forty varieties, and hardly retain four for a second year's trial. I shall now conclude my list with a few of the best in each class of colours, without reference to Zonal, Plain, or Nosegay varieties, my object being to give a list of those varieties which I have found most suitable for bedding purposes.

SCARLET SECTION.

Vesuvius.—Very free, fine dwarf habit, excellent.

Glorious.—Quite equal to the above; fine variety.

Eclat.—Vermillion scarlet, fine, and free.

Clipper.—Fine-shaped flower, stiff grower.

Dr Lindley.—One of the best-formed flowers; habit dwarf.

Excellent.—Similar to the above in every respect.

Nimrod.—Orange scarlet, dwarf; extra fine.

Pride of Osberton.—Very dwarf, most intense bright scarlet with white eye, fine bloomer, and in every respect a first-class bedder; spoken very highly of in the *Gardener* by the editor.

Glory of Waltham.—Fine scarlet, large truss, and excellent bedder.

Monsieur G. Nachet.—Bright red, a fine variety.

Sir F. Kelly.—Orange cerise, extra fine bedder.

Wm. Ingram.—Large truss, a fine variety.

Alfred.—Rosy red, large truss, very fine.

ROSE AND PINK SECTION.

Rose Randatler.—This in a season like the past is very fine; trusses very large, strong growers.

Magenta Christine.—Very free bloomer, bright and effective, fine bedder.

Madam Barr.—Something like the above, but stronger grower.

Rose Stella.—Rosy pink, large truss, fine.

Peach Nosegay.—Flowers dyed peach, colour fine, truss distinct; bedded very fine last season.

Mrs Wm. Paul.—Light rose pink, fine form, good grower.

Eve.—Light pink, a fine bedder, one of the best.

Christine Nosegay.—Dwarf, very fine, and a perpetual bloomer; one of the very best.

Princess.—Rosy pink, large truss, very fine bloomer.

Miss Martin.—Pink, extra fine, one of the best bedders.

WHITE SECTION.

White Perfection.—Pure white, fine bloomer, fine.

Madame Vauchen.—Although old, still one of the best.

Purity.—Good bedder; the colour is very pure.

Madame Martha Vincent.—The best of the white bedders, very free and good habit.

Queen of Whites.—Free and dwarf.

To the above list may be added the following that could not be classed for colour in the foregoing sections.

Sensation.—Salmon, a very abundant bloomer, dark zone, good habit, one of the best.

Chilwell Beauty.—Dark magenta, dwarf.

Salmon Queen.—Distinct and good.

Magenta Queen.—Fine deep magenta colour, good.

Gladiateur.—Salmon, fine truss.

Orange Nosegay.—Fine and effective.

Floribundum.—Salmon rose, one of the best.

GARDENING IN BENGAL.

THE GARDENS OF G. W. BARTLETT, ESQ., AT CALCUTTA.

THIS, besides affording an example of the prevailing characteristics of the generality of gardens attached to European residences in Calcutta and its suburbs, is also specially noted for the large and rare assortment of plants brought together, and the successful method of cultivation adopted, for which the proprietor has maintained a distinguished position during the last thirty years. The garden adjoins one of the thoroughfares of the city (South Colinga Street), and is sufficiently far removed from the route of traffic, with its accompanying dust, to insure all the benefits that a proper garden affords, combined with easy access to the business parts of the city. A high wall divides the roadway and neighbouring houses from the garden, which, in conjunction with the house, affords most material shade to those plants requiring it. Some of the taller trees, scattered about, likewise come in usefully in this respect; but beyond these, artificial contrivances are discarded, so that the cultivation is entirely confined to the open air. The extent of the ground comprises about two biggalis (less than 1 acre), on which is included the house and its offices. The carriage approach, which encircles the garden, serves, also, the purpose of the main walk, the minor walks being confined to the intersection of the ornamental flower-plot in front of the house. The material forming the walks is bricks pounded very small, called here "cankur;" these are laid upon the layer of whole bricks, comprising the foundation of all "pinka," or good roads in this country. When properly formed, their surface is thoroughly firm and dry, even during heavy rains, and in appearance remarkably neat. The European edgings of boxwood, &c., are absent from India, and are here represented by the thick end of bricks formed in lines, projecting above the road material.

Passing the "durwan," or gate-keeper, a most handsome plant of Catesbæa spinosa, upwards of 10 feet high, first arrests attention. In close proximity a lime (Citrus acida) is loaded with most extraordinary large fruit, the properties of which, in the estimation of good judges, are very superior, and the fact of each fruit yielding on an average a quart of juice is a convincing proof of its excellence in other respects. The original plant was some years ago picked up by one of Mr Bartlett's family on the hills of Tiperah. Underneath the shade of the last-mentioned, an important plant of Magnolia grandiflora surprises us with the perfect picture of health it presents, as well as the number of expanding buds fast approaching to perfection. In bringing about these results, Mr Bartlett may be congratulated on his success. This plant is one much envied by cultivators here, but it is a stubborn subject to deal with, and provokingly resists all attempts to coax it into a flourishing condition. Poinciana

regia is next in order, a seedling from the **original tree**, which flowered for the first time **in 1839** in the Calcutta Botanical Gardens; **it is now** 40 feet high, and during the season **of flowering** must present a glorious array of **bloom.** Cereus grandiflora has established its flowering stems 30 feet or so up the trunk of the laſt named, and is yielding its showy flowers in the greatest profusion. As companion trees to the Poinciana regia, we must not omit to mention Lagerstrœmia reginæ (Jarool), Cassai fistula (Soondal), and Michelia Champaca (Chumpaka), all here represented. They are the common adornments of many of our Indian homes, and are no less effective on that account. On the borders east and west of the house, a line of young mangoes, Mangifera Indica (Am.), occupy the sites of a like number of fine old specimens destroyed in the cyclone of 1864. A small crop of fruit was secured during the last season, the flavour of which was highly satisfactory, and promising for future expectations when the trees are more mature. Euphorbia (Poinsettia) pulcherrima occupies a central position, and deservedly too. The rich profusion of scarlet bracts on 200 flowering stems, can be imagined, but not described. In close proximity we have a flourishing plant of Wistaria chinensis, which blooms profusely in its season. Petræa Stapelsiæ also is here, and figures as a standard—an innovation on the ordinary mode of culture. Erythrina maintain their position at the further end of the garden, and must have a gorgeous effect at the season of flowering, individual racemes measuring aſ much as 3 feet. The kinds are E. corallodendron, Christi-galli, lancifolia, Hendersoni, and Barkeri. In proximity to the house, Sericographis squarrosa is shewing symptoms of a profuse display of flowers; the specimen is over 10 feet in height, and will be a most attractive object in another month or so. Close at hand, a fragrant species of Lawsonia makes its presence known. In the plots fronting the house are Fredericia Gulielma—a recent introduction in Bignoniaceæ—which is unusually healthy, and, from its free-flowering propensities, promises to be a most useful climber for this country. Combretum azalianum is as yet confined to thi garden; the original plant is fully 6 feet i height, but it has not produced blossom Echites nutans is in full flower, and is reall good. Rhynchospermum jasminoides, 1 feet high, is particularly sweet, with its exquisitely perfumed flowers. Strelitzia junce and reginæ are strikingly ornamental i foliage, and are blosoming well. Hedychiun coronarium, Periploca esculenta, Bignoni Simmonsii, &c., are all in excellent health Scattered over the grounds we have a goo collection of Ixoras, the more conspicuous o which are I. coccinea, Bandhuca, incarnata stricta, and alba, all growing and flowerin most vigorously. A beautiful species fron Java, with pure white trusses of flowers, is ver marked; as also I. superba, a species wit large ornamental foliage, and with flower that may be compared to a cauliflower i size and appearance. Hibiscuses are anothe very showy genus, and they figure largely i garden decoration. Of H. chinensis a number of double varieties dissimilar in colour are cultivated, the most noticeable of which ar a dark crimson, approaching almost to black and a pure white—both largely employed fo effect by Mr Bartlett. Crotons come nex in variety, and occupy a similar positio to the bays and laurels of home gardens Annual flowers, comprising Zinnias, Gomphrenas, Balsams, and Martynias, &c., ad to the general show; while roses, musterin in great force, still further enhances th effect. Such kinds as the following give thorough English tone to the place:—Abricote (T. S.), Paul's Queen Victoria, Eliz Sauvage (T. S.), Souvenir d'un Ami (T. S.) Souvenir de la Malmaison (I. B.), Mdme Charles Wood (H. P.), Souvenir de Comt Cavour, &c. Cloth of Gold (N.) and Marechal Neill (T. S.) are bushes 10 feet high their flowers are most perfect, the latter especially, which is a great favourite whereve seen.

Plants in pots comprise a large list, an their thriving condition is evidence of carefu cultivation. We would specially mention plant of Antigosus leptopus, in full flowe the colour of which much resembles that o

Dielytra spectabilis. It is a very showy accession to our list of climbers, but cannot in any way compare with Bougainvillæa — at least, judging the comparison from this country point of view, where the Bougainvillæa attains its highest excellence of beauty. The Antigosus is now getting common, and is highly popular with ladies, who see in its wreaths a fit substitute for those of artificial manufacture. Clereodendron Thomsoni is an established favourite, although but a recent introduction. Stephanotus floribunda, Chrysanthemums, Dracænas, Portulaccas, Pelargoniums, Ferns, &c., have all their representatives, and are in excellent health.

We cannot conclude without noticing the tidy manner and excellent order in which all things are kept; while the courtesy and information which Mr Bartlett makes available, leads us to hope for an opportunity of again referring to his place, when the aspect of vegetation will have assumed fuller perfection than at the period of the present visit, which was made in the beginning of the cold season.—*J. B. S.*

Plantations and Hedges.

ON THE ADVANTAGES AND DISADVANTAGES OF REARING FOREST TREES.

BY A. E. WILD, FORSTPRAKTIKANT, EISENACH, GERMANY.

BEFORE entering upon a closer examination of our subject, it would perhaps not be without interest to give as introduction a small history of the artificial rearing of woods. In earlier times, and until the middle of last century, when the felling of trees was carried on without any regard to the state or maintenance of the forest, and regeneration was left to nature, artificial means were only employed in such cases when it concerned the planting of waste grounds; it was when this system became by degrees supplanted by a more organised management of the forests, and when nature ceased to make up the blanks caused by injudicious felling, that necessity first taught man to have recourse to his own hand for filling up these gaps. This method of cultivation found, however, a still greater use through the total clearing, which began to be practised in the pine forests of mountainous districts, on account of this tree suffering so much from the wind. This system of rearing is now at the present time not only employed in the maintenance and rearing of such forests, which, either on account of the nature of the trees comprising them, or from the influence of the elements, are not capable of being raised from the seed of a certain number of mother trees left standing—as, for example, the pine and Scots fir, and by the transformation of low brushwood tracts into tall wood—but also by other forest trees; and in all cases, where this method can be practised, with quite as good a result, and with only small expenditure. It has, moreover, gained for itself an independent position in the rearing of forests, and takes the precedence in many cases of raising from the seed of mother trees.

Each of these methods of cultivation has, however, its peculiar advantages, which require respective consideration before we decide in any particular case either for the one or the other.

As advantages of the system of rearing by means of seeds that fall from the mother trees, we may mention the following points:—

1. The above method is to be preferred in such cases where no particular impediments present themselves without any cost, or at least with only little artificial help. The artificial rearing, on the contrary, requires an expenditure for material (seeds or plants) and for workmen.

2. The natural protection afforded by the mother trees, required by many kinds of plants during their growth could only be replaced by expensive artificial means, if we were to forsake the way of nature and clear the forest completely. Besides that, the growth of such plants as thrive best in the shade would be much greater up to a certain age than if they did not enjoy that protection.

3. When the felling of all the trees takes place at one time, *i.e.*, when the artificial system is employed, the tract thus laid bare must be exposed to the influence of the sun and dry winds, which work more or less detrimentally on the soil according to the space of time which elapses ere the ground can be replanted; whereas, by the method of allowing so many trees to stand in order to sow seed, this drying up of the soil cannot take place to such an extent.

4. When man has recourse to nature for the sowing of his forest tract, and prepares the trees and soil by successive fellings, the trees thus left standing for the purpose of regeneration and protection to the young progeny in its first growth, increase considerably in diameter, on account of having more light and room; and to this increase of wood we may also reckon at the same time a corresponding increase in the value of the trees, which, were we to employ the system of felling the whole at one time, would be lost.

5. The natural method affords, as a rule, a more compact condition, and, as a consequence, a straighter bole, more free from lateral branches than it might otherwise be. Attention must here be paid that the young plants in this compact condition do not grow too slender, which, however, can easily be hindered when the thinning takes place at the proper time, and is continued when necessary.

Having thus put forward the advantages which the system of rearing forests from mother trees afford, let us now consider the dark side of this operation, or, as we may also say, the advantages which the artificial system has for the forester.

1. We can employ the artificial method on barren and unwooded tracts, whereas, in the other method, there must always be a certain amount of trees already standing.

2. It very often happens that the natural sowing is not of itself sufficient to form a regular and perfect wood, which depends, more or less, on the casual fruitfulness of the seed trees. It is also impossible by this system to adjust the errors which are often made, either of felling too many or too few trees.

3. We are thus enabled to maintain the desired degree of mixture and the distribution of the different species in mixed woods in such places as suit their constitutions, &c., which otherwise would entail a particular expenditure.

4. The management of the woods, if we wish to rear from mother trees, is often attended with many difficulties, and requires particular attention and ability, which, by the artificial method, is not necessary.

The irregularity of the seed years causes often the fixed period for felling either to be interfered with, or the wood must be cut all at once too freely, thereby placing the forest too open.

An error which is very generally made may also here easily be committed, viz.: When a plentiful seed year is in prospect from such trees as only bear seed during long intervals, we easily prepare a too large tract, and are then not able to finish the after-cut in proper time.

5. It is not always possible when we make use of the natural system to adhere to the fixed time when the forest should be regenerated by such kind of trees as do not bear seed yearly, but only after long and undeterminable intervals. When a seed year does not occur till much later than was expected, we can then neither continue the generation nor yet the harvest, which is dependent upon the former, thereby often causing great embarrassment in adhering to the fixed yearly supply of wood.

6. A great deal of injury is done to the young progeny by felling the mother trees, and especially when these are cut in summer, and are brought out of the forest in large quantities. We are also not in a position to prevent the mother trees being often blown down by the wind, thus causing much damage to the young plants.

7. By the natural method, the digging up of the roots is in many cases impossible, thus making a loss of root-wood, which, by the other mode, could be easily gained.

8. The expenditure in felling is greater by the natural than by the artificial system, because we do not, by the former, as by the latter, cut the whole wood at one time, but come over the same place several times, thereby entailing a heavier cost.

9. When we make use of the artificial mode, we can then cut down the whole, and replant whenever it is considered fit. Were we, on the contrary, to permit nature to perform the task for us, we must then abide her time. In the latter case, the trees must be old enough

to produce good and sufficient seed to insure a healthy progeny.

10. Lastly, we may mention that, in suitable places, the cleared forest lands might be profitably used for two or three years for husbandry purposes previous to its being replanted.

We draw from the above, in conclusion, that neither of these two systems embraces in itself all advantages, but that a combination of the two is necessary in order to attain the desired end with the least expense and with the greatest advantage. In reality we see the natural system of rearing woods only there exclusively employed where either very favourable positions fully insure the success, or to remain in large extended forests is of scarcely any value, and therefore the rearing of regular and complete young offspring is not absolutely desired. On the other side, the artificial system is only then in exclusive use, where by this means a valuable by-revenue can thus be insured, such as the usage of the ground for husbandry purposes, the obtaining of grass and food for cattle, &c., or where natural hindrances or obstacles are alone by this means to be surmounted.

The manner in which the above systems are to be combined, in order to meet the object in view, is different according to the various exposures and kinds of trees, and is more or less modified by the designs and ends of the proprietor.

WIRE-FENCING, WITH WROUGHT IRON STANDARDS AND STRAINING POSTS SET IN STONE BLOCKS.

BY JAMES KAY, HEDGER, BUTE ESTATE.

FOR a six-wire fence, to stand 3½ feet high, the straining posts should be formed of 1½-inch bar iron 4 feet long, which will leave about 5 inches to be rounded and barbed at the end for fixing into stone. The straining posts should be pierced with oblong holes, so as to admit two lines of the largest number of fence wire. The intermediates should be 1½ inches, by ⅜ inch, and 4 feet long, which leaves the same length to be barbed for fixing into stone, and pierced with ⅜-inch holes for the three top wires; the others may be smaller so as to admit the number of wire used for fencing, and to allow a key being driven in after the fence is erected, so that they may not be driven aside by cattle. There will be a stay required at each end of the fence only, as the intermediate stretches can be made to support each other, a temporary stay being only used while the work is in progress. The stones for fastening the straining posts into should not be less than 2 feet square and 18 inches thick; the stones for the intermediates, 18 inches square and 12 inches thick. If suitable boulders can be got, whether whin or freestone, they may be used.

Mode of Erecting.—Stake off the line of fence, and lay down the "line" in that direction; afterwards take a rod 6 feet long, or whatever the distance is to be between the intermediates, and begin by putting a peg or mark into the ground at the end of the fence, and one at every 6 feet along the whole line. Next, a workman with a spade and pick will be required to dig the pits for the stones. In digging the pits, they should be made a little wider than the stones, say 9 inches, in order that they may be got properly fastened by beating down the earth, but as near the depth of the stone as possible, so that the stones may be got turfed over without being raised above the natural level. The stones should be bored with "jumpers" about ¼ inch larger than the size of the iron, and in boring the holes should be kept wider at the botton than at the top—what is termed "dovetailed"—so that the standard may not be pulled out. The next process is to have the standard fastened into the stone with lead or rock brimstone melted over a slow fire, and mixed with sharp dried sand.* In using brimstone, great care should be taken in having the holes cleaned out, as the least dust will be liable to leave the standard slack, and, not being like lead, it can't be fastened afterwards. After having the standards fastened into the stones, put the straining posts in position, by having them plumbed and made solid. Next, the stays must be put up at the end of the fence. They are generally constructed of two pieces of flat iron, 5 feet long by 1½ by ⅜ inch, rivetted together at about one-third of their length from each end, a small piece of iron about ¼ inch thick and the same breadth as the stay being put betwixt them, so as to leave room for the wire to pass through freely. The ends are welded together, and the end that goes into the stone rounded and barbed so as to hold properly. The upper end is bevelled so as to lie flat against the straining post, under a small projection about 3 inches below the top wire. The standard and stay are rivetted together, or fastened with a bolt and nut, and the bottom end made fast with lead or brimstone. Next, put all the intermediates into the pits. Afterwards take the line, and fasten it in the top wire hole in the straining posts at the end of the fence, and pass it through all the intermediates to the next straining post. Have the line pulled up and kept tense, by attaching a weight to the end of it. This will give a sure guide for levelling the standards, as what is high can be lowered, and what is low can be raised by putting in a little earth, and beating it firm, so that it may not subside afterwards—a point of particular importance. In bringing the standards to a line, this is easily done by altering the stones a little to one side or other. In going round a curve, a line is laid along the ground and pinned out in the form of the required curve; then all that is required is to plumb the standards and make one edge touch the line, which will put them in position. Having all ready, the wires are fastened to one of the straining posts, and run through all the intermediates, observing that none of the knots or splices come in contact with the standards; if this is likely to take place, the wire must be shortened at that part. The next process is to have the wires strained, which is done in the usual way. A small iron wedge or pin will be required to hold the wires till once they are fastened round the post. Keys—small pieces of half-round iron, in the form of a wedge—will be required to fasten the wires in the intermediates, so that they may not be driven aside by cattle. Two wedges, one on each side of the top wires, will do; the one key to be driven off one side, the other to be driven off the other.

In going round curves, stays will be required to support the standards. They may be formed of either round or square iron, and are fastened into stone blocks, and rivetted to the standards. But stays should be used as little as possible, as they disfigure the appearance of the fence, and are liable to be bent by cattle.

Wire-fence standards are now constructed in an endless variety of forms, so as to dispense with stone blocks, and are generally named according to their form, such as triangular-foot, anchor-foot, flange-foot, tripod-foot, sleeper-foot, &c. &c.

Screw-eye bolts for tightening the wires are sometimes used, but are only suitable for the ends of a fence; and even then they are not of much advantage, for after the wires are taken up two or three times, the points of the bolts project past the post, and are dangerous for cattle.

Improved self-winding straining pillars are now extensively adopted, and, though expensive at first, must be the cheapest in the long run, and the most effective for keeping a wire-fence in order, as the wires can be kept strained to the greatest nicety, which is the great principle of a wire-fence. In fact, a wire-fence wholly depends on being kept strained, for if not, it is the most miserable fence extant. There are various forms of improved straining pillars, descriptions of which may be seen on looking through the catalogues sent out by wire-fence constructors, and are, though of different forms, nearly all on the same principle; therefore, we shall not attempt to particularise, but simply say that where a wire-fence is intended to be permanent they should always be used as far as practicable.

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* A compound of brimstone, &c., termed "lava," sold at 14s. per cwt., may be had from John Smith, 5 Great Dove Hill Street, Glasgow. It is considered better than lead, and will go six times as far.

The following is an outline of the construction of a straining post which the writer has used, and which, for ordinary purposes, answers very well, and is not very expensive, and can be easily constructed by any handy blacksmith.

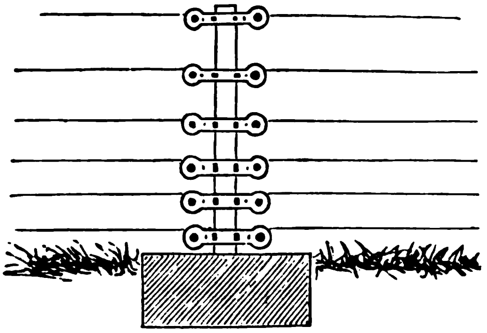

Fig. 1.

The straining post, fig. 1, is formed of 1½-inch square bar-iron, 4 feet long if for a six-wire fence to stand 3½ feet high, fastened into a stone block in the usual way. There is no stay required in intermediate stretches, as one stretch supports the other. The appliances for straining the wires, fig. 2, are two winders (W), turning in two iron plates (P), which are fastened with two bolts (*b*), one on each side of the iron bar (B). The plates are 7½ inches long, and 1½ inches broad, by ⅜ inch thick, in the form of fig. 3.

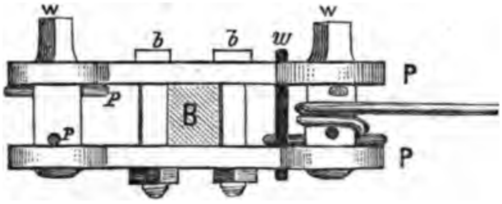

Fig. 2.

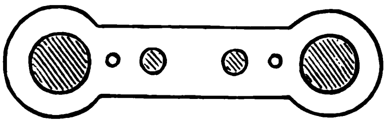

Fig. 3.

The winders are formed of inch round iron, 3½ inches long, three-fourths of an inch of the end of each being formed square, and projecting on one side of the plates for the purpose of being turned by a key when straining the wires. There are two iron pins (*p*) inserted in the winder, cross to each other and close to the inside of each plate. They project about three-fourths of an inch on each side of the winder, and serve to keep the winder in its place, and also to hold the wire, the end of which is inserted in a hole in the winder, at every quarter turn, by a piece of wire (*w*) which is put through the small hole in the plates near the winder.

It will be seen that each straining post serves to strain two stretchers, one on each side of the straining post. As 200 yards is not too much for a stretch, where the line of fence is straight, one straining post will strain 400 yards. Where rigid economy in the first cost is an object, and where there is a long line of fence, a wooden post can be erected between the straining posts for fastening the wires to. Under any circumstances, however, it would be better to use an iron post, as it will not cost much more, being only a plain bar of iron—no winders being required for the intermediate posts. Fig. 4 is another form of winder, formed with a bolt and nut, for fastening into a wooden post. In usi hard-tempered wire it will be found a tage to soften a foot or two of the ends of the wires by heating, which renders it more pliable, and not so liable to break when winding or unwinding it.

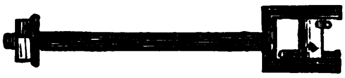

Fig. 4.

The winders and plates for iron-straining posts may be formed of cast-iron, in the form of fig. 5, and are little more than half the cost of malleable iron. By having a pattern made, any quantity may be cast to order. The cost is 1s. 6d. per pair, with bolts.

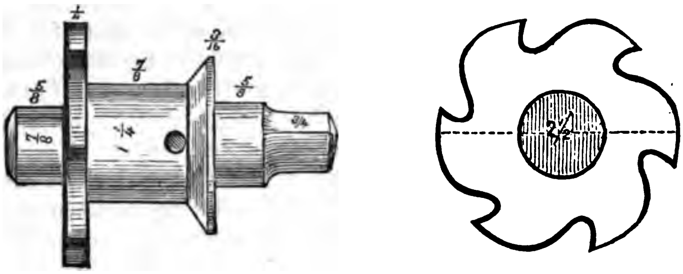

Fig. 5.

Note.—In the erecting of wire-fences it is sometimes necessary, though the fence may be erected with wood posts, to erect iron standards where the line of fence may come in contact with rock. The following is the method of obtaining the exact length of the standards: stretch the line along the ground, and have it brought to a level by putting in bearings to raise it to the level you would have the bottom wire. The distance between the standards are then marked off, and the distance from the line to the rock measured at these parts, which should be noted and numbered for easy reference afterwards. This will give the exact length from the bottom wire to the surface of the rock, which, added to the height of the fence above the bottom wire and the part fixed into the rock, will give the total length of the standard.

ON THE PRUNING OF FOREST TREES.

BY CHRISTOPHER YOUNG MICHIE, FORESTER, CULLEN HOUSE.

AS numerous and conflicting opinions are entertained in regard to the practice and art of pruning forest trees, it may be advisable, before entering upon details of the subject, to consider the practice as it at present generally prevails. Much light has of late years been thrown upon this hitherto somewhat mysterious and obscure art. Science has done much to dispel the haze which surrounded it, standing, as she does, with eyes ever open to observe and detect the various operations of nature, and lend a helping hand. To those who follow the light of true science, the art of pruning is clear and comprehensible; while to those who are drawn aside by every flickering taper, whether lighted only to-day or twinkling for ages, the art is obscure, and the views respecting it are as varied as the sources are from whence they are derived.

Some persons practise and recommend a system of regularly and uniformly shortening all side branches upon the tree to within a few inches of the trunk. This they assert is highly favourable to the healthy development of the tree, by producing spray and healthy foliage. Another class can see no utility in the practice at all, beyond merely clearing the trunk of the tree to about half its entire height of all lateral branches, allowing it in all other respects to remain as it happens to grow. Again, a third class practise a system somewhat allied to pollarding, as practised in woods grown exclusively for fuel. This is done by cutting off all the branches close to the trunk, leaving only a tuft of branches shortened in slightly on the top. The object of this, they say, is to enable a greater number of trees to be grown upon a smaller space, and at the same time to preserve a tall clean trunk. There is yet a fourth class, which includes by far the largest number of those who practise pruning at all, and may be considered to comprise those who are advanced in the art, or who practise it upon what is called the true system, in the same sense as we speak of the high system of farming. This class, though in advance of those previously mentioned, must still be considered as yet far behind in thorough scientific knowledge of the art, but who, it is trusted, will find all their objections fairly met, and their difficulties overcome in the sequel of this paper; for though we may be considered in error in the general practice of pruning, they may yet be led to a better and more advanced acquaintance with their profession.

A thorough knowledge of vegetable physiology, and of the laws generally that regulate the health of plants, is as essential to the man who practises pruning, as a knowledge of anatomy is to the surgeon who amputates a limb from the human body. No particular, rigid law can well be laid down for pruning, so as to be applicable to every case with unerring certainty and success; therefore the only true way to arrive at perfection in the art is to examine thoroughly into the true nature of the laws and principles that regulate the healthy development of plants in all cases, conditions, and circumstances. In the words of Professor Lindley—"The object of the pruner is to diminish the number of leaves and branches, whence it may at once be understood how delicate are the operations he has to practise, and how thorough a knowledge he ought to possess of all the laws which regulate the actions of the organs of vegetation. If well directed, pruning is one of the most useful, and if ill directed, it is one of the most mischievous operations that can take place in forests."

Again, the same author says—"Pruning may be regarded as a necessary evil, to which the wise must submit because of the ignorant: the careful, to cure the evils inflicted by careless." The substance of the doctor's remarks would do well to be engraven upon every pruning-knife, and kept constantly before the eyes of the operator. We apprehend it will appear from the foregoing remarks, that the principal, if not the only cause, of the difference of opinion that exists in regard to pruning, arises out of ignorance of the principles upon which it ought to be performed. We strongly recommend those who doubt the efficacy of pruning to become their own judges of the art. Let them examine plantations where judicious pruning has been performed, and compare them with plantations that have either been improperly pruned, or not pruned at all. By this means they will be more readily convinced than by any abstract reasoning or advice.

For the sake of those who wish to obtain a knowledge of the principles and practice of pruning in detail, we subjoin the following instances at some length:—First, as applicable to hardwood trees; and, second, with respect to pines; specifying, however, only as many as may be deemed sufficient to illustrate the subject. The first case, when pruning may be considered necessary, is that of a hardwood tree on its being transplanted from the nursery to the forest, from a richer to a poorer soil, from a sheltered to an exposed situation, or from the tree having had the bark gnawed off by stock or game, or having become otherwise injured so as to cause it to die down to or near the surface of the ground, or the top having become dead, which latter occurrence frequently takes place in large trees, particularly if imperfectly rooted previous to transplanting. In this case, the only sure means for recovery of the tree is to cut [illegible] over. In small plants we cut to within an inch of the ground's surface, and the part removed [illegible]s stripped of the small branches sharped [illegible] into the ground [illegible] from which it [illegible] mark for the [illegible] the stools in June [illegible] away from them all superfluous shoots, leaving only the strongest and straightest on each to form the future tree.

With regard to trees of more advanced growth, whose top has decayed, we cut off only the dead part back to where the stem is vital, allowing a leader to start from the strongest shoot upon the stem. This we often find of advantage where cattle or other animals would be likely to destroy the plant, if cut within their reach.

In transplanting large trees for ornamental purposes, we generally cut a portion off the top or reduce the number of the large branches; this not only lightens the top of the tree, and prevents the wind from having undue effect upon it, but also causes a larger quantity of sap to ascend what remains of the branches and top thus newly produced.

The next case we shall describe is that of a tree at various periods of its growth, from a sapling upwards, that has branched off into two or more stems. This occurs both when the tree is of spontaneous growth and also when it has been transplanted, but it must be admitted that it occurs more frequently in the latter case than in the former. When this occurs only with saplings, it may appear a circumstance of small importance, but it is far otherwise in the case of a tree when it attains any considerable size; thus, not only is the foliage deficient on the inner side of the two limbs confronting each other, but the tree is in consequence of the diminution of branches correspondingly injured in its roots. The tree in this form occupies an undue extent of surface of ground, and instead of becoming a beautiful and magnificent object, with a compact massive trunk, alike valuable and beautiful, develops itself into a mere collection of limbs and branches, radiating from two or more large ones, neither a subject for the artist nor useful to the mechanic. Nor is this the only evil that may arise from tolerating such a tendency in the growth of trees to go on unchecked, for it must be borne in mind that it is now a well-established fact that the roots of trees bear an approximate proportion to the branches, that the two run usually in the same direction parallel to each other, the one above and the other beneath the soil, so that in such cases the roots occupy as undue a portion of the underneath ground as the branches do of space above. Another consequence of the above result is, that the half of a tree which is unfavourably exposed to the prevailing hurricane is often blown down, and the remaining half shares a similar fate when the wind changes round to the opposite quarter to that from which it first blew. As a remedy, therefore, against this evil timely pruning is the thing required. In operating upon a sapling, we cut off at once the branch close to the bole of the tree, but if the limb or branches are too large in proportion to the tree, to admit of being cut off at once, we shorten it by degrees till sufficiently small to admit of being cut clean off. Not only is the proportionate size of the branch to be taken into account, but the state of the tree's health at the time must be observed and studied, together with the situation in which it is growing.

These constitute some of the principal features to guide us in deciding whether the branches are to be reduced by degrees, or cut off at once.

When a tree divides into a double top, at a height below what constitutes a good trunk or stem, we lighten one of the tops by cutting off about one-third of its entire length—that is, if the annual growths are large, the top much drawn up, and with few lateral branches upon it; but if the annual growths are comparatively short, say from 12 to 15 inches in length, and fully furnished with lateral twigs, we at once cut away close to the leading stem the less favourable-looking shoot of the two, and, in general cases, the one that would be most likely to be broken off by the prevailing winds in the locality. Pruning in this case is generally performed by means of the pruning-chisel, which is used to great advantage upon trees when beyond a man's reach. The chisel, which is made with a socket, is fastened upon a long handle by means of a screw-nail. The handle may be of any convenient length, from 8 to 20 feet, or upwards. The handle of the chisel, when sharply struck with a small wooden mallet, will cut even a large branch at a single stroke; and if the handle is perfectly straight, and fills the socket completely, the length of the handle does not diminish the force of the blow in any important degree.

It frequently happens that a tree, from some accident or other, loses its leading top at an early age; the consequence is, that a number of branches strike off in a horizontal direction, but none of them take an upright position, and this renders the tree quite a shrub of a somewhat pendulous and spreading appearance. A tree in this state would probably ever remain as a mere arboret, or bush, if left to itself. In this case, when hares and rabbits are not to be feared, we at once cut over the tree to within an inch or so of the ground. A young tree is thus allowed to form; and though the tree, when cut over, may be 6 or 8 feet high at the time it is cut over, yet in two or three years afterwards (if the tree is healthy) a young sapling will have taken its place, which, though not so strong, will be nearly, if not quite, as tall as the original tree, more handsome, more healthy, and better directed in its upward growth. A tree once fairly established in the ground will, when cut over, produce strong and vigorous coppice. From this the most promising shoot is selected for the future tree, choosing always that one which is lowest down upon the stool. If, however, as is frequently the case, hares or rabbits are to be dreaded, we cut the tree over at a point above their reach, and immediately below where a year's growth terminates, and where few branches exist. In cutting over close to a collection of spray or small branches, the sap is attracted to them, and the newly-formed leading shoot is thus deprived of the requisite support to its proper development. A very common occurrence in this case is, that a quantity of spray is formed immediately below the cut part, particularly if the tree is at all unhealthy or of stunted growth. Trees thus operated upon in winter and spring should always be again gone over in the succeeding June or July, and all superfluous shoots broken off with the hand, which is better than the knife in ordinary cases; and when the woods are clear of game, we prefer adopting the former system, but when the reverse of this is the case, we adopt the latter, as the young shoots become at once a prey to hares, rabbits, and deer, and are seldom allowed to make a start over one year's growth, as the wood formed in the summer is utterly destroyed during the succeeding winter.

This kind of pruning is seldom necessary except in high and exposed situations; but under such circumstances we have often adopted it with the greatest success.

Another subject for pruning is, where a branch grows off from the main trunk of a tree at an acute angle, causing the bark to fester at the point of junction of the two surfaces. Trees thus affected become almost worthless for ship-building, and other purposes in trade where good sound timber is required. True it is, that oaks are seldom of the best varieties affected with acute-angled branches, yet they are so occasionally, —even the Quercus robur, whose branches generally go off at almost right angles, is, in some cases, so affected. Since then we find nature producing branches of this description upon trees—and trees thus grown are ultimately nearly useless for ship-building purposes, at least, unless timeously denuded by pruning—art must therefore step forward and take nature by the hand, and guide her forward in the path most conducive to the convenience and interest of man; and in no instance can she do this more certainly, and with better success, than in cases such as the above. While the young sapling is within reach of the hand, we use only the common pruning-knife, but when above reach, the pruning-chisel must be used; and in doing so, we proceed in one of two ways—viz., when the branch to be operated upon is situated upon a tree of rapid top growth—that is, when the leading shoot is long and slightly drawn up, with comparatively few branches, we reduce the branch by cutting it back to about one third or one half of its entire length; [illegible] when the tree is tolerably [illegible] proportion to its length, and is fully developed in its lateral branches, we cut off the branch close to the trunk at once. The object of this department of pruning is to [illegible] the consequences of the bark growing into the body of the tree, and to prevent high winds from splitting off the limbs at any future period of its growth, and also the injury that frequently occurs from the lodgement of heavy falls of snow upon the tree.

Another frequent case for pruning is that of branches having become dead upon a tree. So long as the branches are vital, they are in a state of growth and enlargement, forming woody layers along with, and in some proportion to, that of the trunk of the tree whence they issue; but as soon as life ceases in the branch, the annual layers of wood upon the trunk, by continuing to increase gradually, encloses the base of the dead branch attached to it, and which, as it becomes enveloped in the wood upon the trunk, forms the much-complained-of *black knot.* If this occurs in a young tree, while the branch is a comparative twig without heart-wood, it soon decays and falls off, and no serious consequence arises from it, but when a large branch dies upon a tree after the heart-wood is formed in it, an evil of no small magnitude is incurred. The dead branch in this state remains upon the tree for many years, and until embedded several inches in the trunk by the increased annual layers upon it. The consequence is, that when the tree is sawn up into boards, a black knot is frequently found to go right through it, and on the wood being seasoned it frequently falls out, thus leaving a hole in the board, and rendering it useless for many purposes. Therefore, in all cases in young growing woods and plantations, we at once prune off all decayed branches from the main body of the tree; we do not care to prune them off large branches, or even small limbs, but only off those parts of a tree yielding timber. In pruning off dead-wood from young trees, we use only the pruning-knife or chisel; but when the trees are aged, and the heart-wood formed in the branches, the operation is performed by means of a ladder, hand-saw, and spoke-shave. With the latter instrument we carefully smooth over the surface of the knot where the branch existed, clearing away all decayed matter around the part where the bark comes up to. We then paint over the dressed knot, in order to prevent decay in the tree, to protect it till the bark covers it quite over, and to bring the knot to the natural colour of the bark of the tree. White lead mixed with oil, a little lampblack and red ochre, serve in most cases for this purpose, and may be mixed to any required tint. The most efficient preservative against decay in trees is an application of Archangel tar. For trees of a dark-coloured bark we prefer tar to paint, taking care to apply it sparingly in hot weather, as it is apt to run and spread if laid on thickly. White lead alone is often most like the lichen upon the bark of old trees, and for any conspicuous part it may be made an excellent imitation. We do not recommend the practice of taking off dead limbs or large branches from old ornamental trees; such treatment we regard as a needless interference with nature. Just as proper and natural to pluck the silvery locks from an old man's beard, to improve his look, as to remove the hoary, romantic, and picturesque arms from an old tree, particularly the "brave old oak," whose venerable age has won him renown.

It frequently happens with trees standing singly, by removal of others from them, that at some particular part upon the stem a great number of branches are developed, and, in consequence of this, that part of the trunk immediately beneath becomes disproportionately thick in comparison with the part above where the branches occur. The sap is thus in a great measure obstructed in its ascent to the uppermost branches, and the top of the tree is cut off from its due measure of support and enlargement. In order, therefore, to guide the sap in a proper direction up the tree, this profusion of branches must be diminished. In doing so, we cut a few of the small branches clean off close to the main stem, and reduce the larger ones about one-third of their entire original length, taking care in all cases of shortening to cut close above another branch or small twig growing upon it, in order to preserve the branch alive, and also to conceal the cut part. In pruning within policy grounds, or in sight of carriage drives, considerable art is required, so as to conceal from view the wounds inflicted upon the tree. When above the level of the eye, it is necessary to cut on the concealed side of the branch, and, in general, so as to be least observable. In a very important sense, pruning ought to be performed and regarded as a species of pilfering.

This case applies principally to young trees, and the object to be attained is their proportionate development, as a remedy against undue enlargement of the tree below the mass of branches, by diminishing which the sap is induced to ascend so as to nourish and enlarge the more slender part of the tree above. It is frequently indispensable to have timber from trees which have a clear, straight, and tall trunk, free from knots, and clear of lateral branches to a considerable height; and in order to attain this in the most perfect way, the trees should be grown only at such distances apart as sufficiently to check the side branches when young, and a few trees gradually thinned out at a time; but this practice, from reasons well-known, is often found impracticable. The only alternative, therefore, is to assist nature in clearing the bole of the tree of all lateral branches. It is often difficult to say what the truly natural habit of trees is, as soil, climate, and situation have each a powerful influence in altering their appearances, and even their qualities. We find that when trees are grown singly, and are fully and openly exposed to sun and air, they are in most instances clothed with branches from near the surface of the ground to the top, so that the aid of art is called in to assist in producing a clear, tall, handsome, and useful tree. Pruning in this case might be almost, if not altogether, rendered unnecessary by timely and judicious thinning; yet, as already stated, this in the general management of woods is found impracticable, and consequently pruning is rendered a necessary operation. The operation of clearing the bole of a tree is the simplest of all departments of pruning, and is performed upon young trees with the pruning-knife; but in the case of tall trees, and those further advanced, the pruning chisel is employed. As a general rule, the trunk of the tree is kept clear of branches to about one-third of its entire height: thus, a tree 30 feet in height should have a clear trunk of 10 feet, and a tree 60 feet high a trunk clear to 20 feet. In low-lying sheltered situations, where the soil is deep, the trunk of the tree may be cleared to nearly half its entire height. Though this is the simplest process of pruning, yet it is in many cases sadly abused by clearing the tree of its branches too near the top, and roughly doing the work. It is often necessary, although not desirable, to prune trees in hedges, and along avenues, rides, carriage drives, and roadsides, not with the object of benefiting the tree, but only to check the growth of the branches, and prevent them from unduly hanging over, thus shading surrounding crops, and impeding carriages upon roads. In this case the principal attention and observation required is, to lop off the offending branches without imparting to the tree a mutilated or manufactured appearance, to cut each branch so as to leave the part remaining upon the tree in such a state as sufficiently to elaborate the sap and maintain vitality in, and impart nourishment to, the tree. In the operation itself, sometimes the saw and spoke-shave, and sometimes the pruning-chisel is used, but in either case the greatest skill is required in amputating the branches in such a manner as to be altogether unobserved. In this department of pruning no positive definite rule can be laid down as applicable to all cases, as the entire execution of the work depends upon the taste and skill of the operator. We always cut either close to the trunk of the tree, and dress and paint the knot so as to avoid observation, or cut at such a distance from it as to secure and maintain vitality in the branch, and preserve the symmetry and outline of the tree. In amputating a large limb we always endeavour to do so within an inch or so of a smaller branch, and thus many a noble tree is preserved from falling a victim to the woodman's axe, or being subjected to a piteous mutilation. We should wish to dwell upon this point of pruning, and would do so but for want of space. It is remarkable how proprietors, of cultivated minds and refined taste, can tolerate the unskilful and distasteful manner in which handsome and often noble trees are so outrageously disfigured by unscientific and inartistic pruning. But, as already remarked, this instance of pruning is not performed with a view to improve or benefit the tree, but simply for other yet very important reasons.

In the case of one large branch, or a number of branches, starting and growing upon one side of a tree, such branch or branches, from being disproportionately large, attract an undue amount of nourishment to themselves; thus a tendency is created to overbalance the tree by an excessive weight of branches and foliage on one side. A tree thus unequally balanced increases in woody matter on the side to which it inclines, and this evil is increased two-fold; as the tree advances, it extends and establishes its roots most upon that side upon which the greatest number of weighty branches are situated. The seemingly unimportant circumstance, which commenced in a disproportionately large branch, soon becomes magnified to such an extent as to terminate in very mischievous results. A reclining tree occupies several times the space that an upright one would do. It is more subject to be loaded and broken down with snow, it is unequally rooted, being deficient upon that side where fewest branches are situated, and, consequently, more subject to be blown down with winds, the annual layers of wood being much thicker upon the under than upon the upper side of the tree. The timber manufactured from such trees twists and warps in such a manner as to render it useless for many important purposes, therefore the necessity of pruning, in order to properly balance the tree.

It sometimes happens that, from the weight of fruit or foliage upon a horizontal branch, from lodgement of snow, or some other cause, that a branch or limb is so bowed down as to rest upon another below it, and from the friction of the wind, the two branches are rubbed upon each other, often producing irritating sounds upon the ear, mutually disfiguring each other by friction, destroying the foliage of the branch upon which the upper one rests, which, from an undue weight upon it, also presently gives way. During heavy falls of snow, we have seen many noble trees thus all but totally destroyed, which, by attention to the removal of such branches in due time, might have been entirely prevented.

REMARKS APPLICABLE TO HARD-WOOD PRUNING.

The oak, which generally stands first in the class of hard-wood trees, and may be looked upon as the kind of tree which pruning most benefits, may, at some period of its growth, come under one or other of the cases of pruning previously laid down. One individual tree will, however, seldom or never embrace more than two or three of the instances cited; when each case has been carefully studied and understood, any intelligent person will perceive at once which of them applies to the subject under operation. What applies to the oak is equally applicable to the ash, elm, beech, lime, sweet chestnut, hornbeam, and mountain ash—that is, any one of them may be pruned at any period of the year except during frosty weather, except in cases when the plants require to be cut over close to the surface of the ground, and in such cases we prefer doing the work either during the last week in February or the first week in March; because if a plant is cut over late in summer or early in winter, it is so long exposed to the wet as materially to retard, if not entirely to prevent, vegetation. The sycamore, great maple, lime, and birch, &c., we prefer pruning during the months of June, July, August, and September, when the sap is most active, and when the solar heat has the greatest influence. The sun, during this season of the year, produces also a hardening influence upon the newly inflicted wounds, which by this means are sooner healed up, as the bark then more quickly covers the wounds than if pruned at any other season of the year. In order to test the effect of so doing, we have pruned sycamore and birch during December, and have found them bleeding from the wounds during the succeeding April and May. But we have never found any injurious results from pruning during summer and autumn.

At that season of the year, when the sap-wood is maturing, there is least danger of spray being produced from the wounds, and equally so of the tree bleeding.

REMARKS APPLICABLE TO PINE PRUNING.

Assuming that the principles upon which proper pruning should be conducted is laid down sufficiently plain in the foregoing statements, as applicable to hard-wood trees, we need only further add a few remarks upon that other branch of the subject—viz., pine pruning. In consequence of the difference of the growth, constitution, and nature of the pine as compared with those of hard-wood trees generally, pruning coniferæ is rendered a practice much more difficult, and in most cases more or less hurtful. It is upon consideration of this delicacy alone, and not from the habits or development of the trees outwardly, that pruning coniferæ is so essentially different and opposed to the pruning of hard-wood trees. When we take into consideration the difference of the ingredients which constitute the fluids of trees, such as gum, sugar, turpentine, resin, &c., it is not a matter of surprise that pruning should produce such varied and opposite effects, nor is this more evident in any instance than it is by artificially exciting the growth of pines and thus deranging the natural course of the fluids; and it is immaterial whether the subjects operated upon are transplanted trees or those of spontaneous growth, the results in either case being much the same.

Artificial manures, undue richness of soil, excessive moisture, and pruning, each produce results to the pine hurtful in their way. In a brief account of pruning, such as this, it would be out of place to enter minutely into details upon the crystallizing process which the fluids of pines undergo on being disorganized or deranged in their functions. We will, therefore, simply state the effects that have been produced on pine trees pruned under various circumstances and in different ways.

First—We have found pruning of decided advantage to pine trees below fifteen years of age, in the way of relieving them of double stems or double tops. The advantage gained to the pine tree is similar to that gai hard-wood in relieving the double top; we consider this the most beneficial of all pruning applicable to pines, and of all others is most frequently called into requisition, especially for silver fir (Pinus picea), as this tree is very liable to grow with a double top, which is deleterious and hurtful by splitting.

Second—A case in which pruning is of advantage to pines, is in pruning off the dead-wood. From the circumstance of this tribe of tree being planted closely together in masses and groups, in order to become most useful for the purposes of art, the growths of the lateral branches are soon so much checked as to cause them to wither and die, and in this decayed state they will remain upon the tree for several years. The trunk of the tree, meanwhile enlarging, the dead branches become covered over with the annual layers of wood, and thus black knots are formed; and when boards are sawn out of trees thus affected, the knots in the boards, when they are seasoned, drop out, leaving a hole through them as if cut out with an auger. When the dead branches, however, are removed from the trees immediately on becoming decayed, the lesser of two evils is the result—viz., a dark spot only instead of a hole, which may in most cases be regarded as of small importance, except in very thin deals, when they may partially appear on both sides, though seldom even then. Pruning, therefore, under such circumstances, is of a very decided advantage to pine timber.

Third—Another system is pursued in the treatment of coniferæ—viz., that of pointing or shortening the side branches, in order to promote the top growth of the tree. We have made several experiments of this kind of pruning in order to satisfy ourselves on his point, and the result of the experience is convince us of its inutility to accomplish ne object in view, irrespective of its impracicability in the forest. We have, on various ccasions, headed back the side branches of rees growing up side by side with others which had not been pruned, and, at the expiration of four or five years, on comparing heir respective growths, have found that the which were not pruned had made growths equal in length, and rather stronger than those which were operated upon. However, if for any particular reason, apart from economy and utility, it is desirable to check the side growth of pines, we would, in every case, pinch off with the hand the buds or tender shoots.

Fourth—Any pruning performed upon the branches of coniferæ should be done during September or October, as during these months the fluids are in a more fixed state, and are not disposed to ooze out so freely as earlier in the season; and if deferred till winter, the wood being in an expanded state during frosty weather, a greater portion of it would become decomposed before the bark covers over the wound than if the operation had been performed in autumn.

As regards the pruning of dead-wood, the case is materially different, no wound being thereby inflicted in the vital part of the tree, and, consequently, the fluids remain undisturbed. One reason, however, for pruning off dead-wood in spring and during summer, instead of during the colder months of the year, is in consequence of the tendency it has of lowering the temperature of the plantation; dead-wood probably produces that effect more completely than any moderate degree of thinning could do. The benefit, however, arising from pruning off decayed branches from pine and fir timber is so great, compared with the evils that can arise from it, that in all cases, when practicable, it should be adopted.

REMARKS APPLICABLE TO PRUNING CONIFERÆ.

In several instances we have headed back pine trees under twelve years of age. In some cases where the top had been injured, we headed them back with a view to induce a fresh leader to form, and in other cases we have headed them back by cutting off sometimes one and sometimes two or three years' growths, in order merely to observe the results; and, in every case, within a few years, symptoms more or less unfavourable made their appearance. The top, in some cases, died back the second year to where it had been cut over, and, in other cases, the trees either lost much of their previous vigour of growth, or became covered over in their stems and branches with resinous globules. We headed back some larches, by cutting off two or three years' top growths, when the trees were about six years planted. The trees were growing at an altitude of about 600 feet, and the top shoots were about 18 inches in length. This was done with a view of testing the effects of a stimulated growth upon the trees, when within four years from the time of the operation, there was a decidedly visible superiority of growth upon them compared with those that had not been cut. Nothing, however, is to be gained by top-cutting of larch, but, on the contrary, considerable loss and risk; hence, it should not be practised. It is further suggested in reference to pruning, that no branch be cut from a tree that is not doing positive harm or injury to it, and that every branch is a source of nourishment to the tree, and every leaf a medium through which the tree is supplied with the elements which nourish it.

Spray or young shoots formed after cutting off branches, though vigorous and healthy at first, will, unless the tree is in a very vigorous state of growth, wholly or partly, die or grow sickly the second or third year, and the once broad healthy leaves, which pruning was the cause of producing, become only a poisonous provocation to the plant.

Diminishing the number of branches upon a tree is an indirect way of preventing it from procuring food for its support and development. Let no decayed limbs or horns be removed from very aged trees unless broken or otherwise disfigured, but let damaged live branches be removed in every instance. No pruning can be considered practical and efficient that does not interpret and clearly explain itself, and no person is capable of judiciously pruning who cannot give a good and intelligent reason for so doing, by explaining it, if not in scientific terms, at least in a manner agreeable to science.

ON THE CORSICAN PINE (PINUS LARICIO).

BY JOHN M'LAREN, FORESTER, HOPETOUN HOUSE.

THERE are few sights more pleasing than a view from some moderate eminence: where, standing on its highest ridge, the surrounding country is seen rolling away in its endless variety of hill and dale, woodland and water. The eye rests with pleasure, here on the chequered cornland, there on the winding stream, glittering in the sun, or almost hidden in the thick mantle of wood which crowds its banks, as it threads its way to the sea. Or we trace the forests clothing the hill sides, and running in shade and darkness into the deep valleys, here and there relieved by gleams of sunshine breaking in upon the gloom of their hidden depth; while all around, nestling in the bosom of rich foliage, lie the dwellings of the landed proprietors—men whose refined taste and noble enterprise have materially added to the beauty and natural wealth of our country. As we descend, the extent of vision lessens, but the distinctiveness of the nearing objects grows upon the eye. The plantations, which before were vast masses of dark green rolling away over the plains or uplands, now throw off their general massiness, and begin to open their ranks for closer inspection. Then tree vies with tree, foliage with foliage, trunk with trunk; and questions of contrast, comparison, beauty, and usefulness insensibly take hold of the observer. Now, in this sensible pleasure, awakened by the landscape, the forest plays no mean part, for, were the country divested of its woods, immense sweeps of bare land would sensibly fail to awaken those emotions which spring from the view of a well-wooded district. We do not wonder, then, that to the of taste and refinement, the introducti cultivation of the best varieties of forest trees should ever be a question of deep interest and importance. Of their absolute necessity to our commercial interests, social progress, and household comforts, no one will doubt. While coal and iron are the bone and muscle of Britain's greatness, *wood* must ever, for mechanical appliances, form her great right arm.

Here, then, both the man of culture and the man of practical and utilitarian tendencies meet in one common desire for the cultivation and extension of those trees that are most useful and ornamental, and the question for our consideration is how best to introduce and propagate those kinds which possess these qualifications. In endeavouring so far to answer this important question, I will confine my remarks at present to the Corsican pine (Pinus Laricio). By those to whom this noble pine is familiar, its peculiar adaptation to our climate, its hardiness, beauty, and worth as a timber tree, will be frankly acknowledged; while to those to whom it is a stranger, it only wants a trial to render it a general favourite. The more extended introduction and cultivation of the newer coniferæ being a branch of arboriculture in which I have taken a deep interest; and having had, for many years, a considerable collection under my charge, among which figures the Corsican pine, I take the liberty of laying before the Scottish Arboricultural Society a short statement of my experience of, and the impressions on my mind arising from, the cultivation of this pine. These were planted here (Hopetoun) in different soils and situations, and in each case their progress, appearance, and promise are all that can be desired. The largest was planted twenty-five years ago in a light yellowish loam with a rocky subsoil, about 450 yards from the sea, and 100 feet above its level. It is now upwards of 41 feet high, with a straight clean stem, 4 feet 7 inches in circumference at 4 feet from the bottom, thus giving an average of 19½ inches in vertical growth, and 2⅓ in circular, per annum. A few other conifers were planted in the pinetum here (the soil is clay, with an admixture of sand, and a retentive subsoil), and, for the sake of contrast, I will now give a list of some of the most hardy under my care, adding to each plant its growth for a number of years. The order in which the names are given is that of hardiness, usefulness, and ornamentation, beginning with the first, although in some of the varieties it is difficult to give a preference to one over another:—

Picea Nordmanniana	grew	7	feet in	9	years.
„ nobilis	„	6	„	8	„
Abies Douglasii	„	12	„	10	„
Cedrus argentea, or Atlantica	„	13	„	10	„
Wellingtonia gigantea	„	9	„	6	„
Pinus Laricio (Corsican)		14	„	11	„
Pinus Jeffreyii	„	5½	„	5	„
Pinus monticola	„	12	„	11	„
Abies Menziesii	„	12	„	11	„
Abies Morinda, or Smithiana	„	9	„	10	„
Picea Pinsapo	„	5½	„	7	„
Cedrus Deodara	„	13	„	11	„
Picea grandis (of Loudon)	„	4	„	5	„
Pinus Benthamiana	„	9	„	9	„
Pinus Pyrenaica	„	5½	„	5	„
Picea Parsonsi, or lasiocarpa	„	6	„	7	„
Pinus Austriaca	„	14	„	14	„
Pinus Cembra	„	10	„	12	„
Abies Albertiana	„	15	„	14	„
Pinus Strobus (Weymouth)	„	12	„	13	„
Abies orientalis	„	7	„	6	„
Abies Whitmaniana	„	8	„	7	„

Although it would be vain to attempt to uphold the P. Laricio as the most ornamental and useful, yet for general planting I have no hesitation in stating that there are none to equal it, the price being now a little more than that of Scotch fir. I planted a considerable number of it on a piece of ground called, from its bare aspect, "The Heather Muir," and which a few years ago was covered with heath. The soil, as may well be conceived, was not of the best description for trees. Its surface was composed of that thin light sandy soil common to heath tracts, and having a subsoil of a stiff, hard clay. Along with these were planted spruce, Scotch fir, and larch; and although many of these were injured, and numbers entirely destroyed by hares and rabbits, with which the place abounds, none of the Corsican pine was injured. This of itself is no small recommendation. They shew, too, every symptom of vigorous and sustained growth, are outstripping the others in size, are cleaner in the stem than the Scotch fir, are altogether free of the insect commonly called aphis, have none of those ulcerated wounds so common to the larch, and even during this rather trying season (1868) many of them grew upwards of 18 inches, while their neighbours, the Scotch fir, &c., have made on an average only 14 inches. Judging from the appearance of the largest specimen here, its handsome pyramidal form, its regular branches in distant whorls (caused by its rapid growth), and rich foliage, I can well conceive its magnificence in its native forests; where it attains a height of sometimes 130 feet in 70 or 80 years; and clothing the mountain ranges bordering the Mediterranean Sea, it adds materially to the natural beauty of the landscape, and the wealth of its native country. Its wood is of a whitish colour, with a darkish tinge of brown near the centre, is rather long grained, pliant, easily worked, very resinous, and durable. From its more rapid growth, and larger dimensions when full grown, it will produce more timber in a given period than the Scotch fir, and, therefore, even when viewed merely in the light of an economical question, it is well worthy of general cultivation. From my experience and observation of it, I think it is not very particular as to soil or situation, but will thrive almost anywhere, except on chalky formations—a condition unknown to Scotland—and on lands heavily surcharged with moisture; although, like the rest of the pine tribe, it prefers a rich sandy loam, or a soil consisting of decomposed primary rocks, especially granite, with a cool dry subsoil in all cases. Of course, being a pine, it does not require a very deep soil, as it is a surface rooting tree. It would form an excellent substitute or successor to the Scotch fir, especially since the real Braemar variety is being gradually supplanted by a spurious coarse one not worth growing, and of which it will be difficult to get rid; while the price of seedlings, especially, is exceedingly moderate, being from 10s. to 15s. per 1000. When planted along with hardwood trees it forms an excellent shelter to them, because of its rapid growth and luxuriant foliage, its leaves being from 4 to 6 inches long, springing generally in pairs, though threes are very frequent from a short sheath; while its rich green hue and general beauty add materially to the appearance of the forest, &c.

From the personal culture, and from observation elsewhere, I heartily recommend the introduction of this pine into our pleasure-grounds, lawns, and general plantations, feeling perfectly assured that, both as a hardy ornamental tree, and a producer of good, durable, and workable timber, it has very few equals in the numerous class to which it belongs.

The Stable.

CLIPPING AND SINGEING HORSES, AND SHEARING SHEEP IN COLD WEATHER.

By Joseph Gamgee, Sen.

IN returning to the consideration of this subject, the season chosen may appear to some readers inappropriate for eliciting notice, horse-clipping being now, with few exceptions, given up for the summer months. But the chronic effects of clipping remain, and will be manifest on horses subjected to the ordeal in the past winter for some months longer, as any observer may verify where the most splendid of their kind in the world are to be found, say at Hyde Park, London, which, in indefinite variety, will exhibit all diversity of hues, with little of those most brilliant and natural colours such as only horses with unmutilated coats acquire. But the long ranks of street cab-horses in London, and other towns, afford the observer the readiest means of seeing the effects of clipping on a large scale, those types of misery are to be found day and night, winter and summer.

With regretably few exceptions, the horses of this kingdom are annually clipped, and many of them subject to repetitions at given intervals during autumn and winter. As an exception to the rule, we have two classes of horses which [illegible] some unexplained common consent [illegible] escaped that scourge—the [illegible] horses [illegible] managed cart horses; [illegible] form [illegible] the picture of [illegible] being un- [illegible] cart [illegible] since [illegible] these, use [illegible] dry, tight skins [illegible] of elasticity to the [illegible] unlike that of horses in good case.

[illegible] I first gave my views on the effects of clipping to the public, in a paper published in *Bailey's Magazine*, and in the following year in another paper, published in *The Journal of Agriculture*. I shall not, therefore, at present go at length into the history of horse-clipping, but take up the subject from such points of view as the constantly occuring new phases in its relation suggest.

A recent prosecution, instituted by the Society for the Prevention of Cruelty to Animals, against a salesman of the Metropolitan Cattle Market, for exposing ten sheep there, on the 29th of March, which had been recently shorn, is familiar to most readers. The magistrate before whom the case was carried, at Clerkenwell Court, decided, after taking evidence that cruelty had been done in the case, according to the meaning of the statute, and he convicted the defender in a small fine, or in default, imprisonment. This case will prove instructive to administrators of justice by the precedent it establishes; but it will prove to have done much more for physiologists by the facts it has brought out, and the phenomena observed, as deponed to by witnesses. "A Lincolnshire Farmer" has addressed a letter to the press, in which the writer complains of the recent prosecution, arguing, though on somewhat contradictory data, that farmers themselves are the proper custodiers of their own interests, such as the case represents. The writer then says, "Now, weather is a very precarious matter to deal with. . . . In the year 1860, the 28th of May was the coldest day during the season, and, being clipping time, many hundreds of sheep died from the cold." Whether these sheep were clipped in warm days, and cold ensued afterwards, or whether they were clipped during unpropitious weather, regardless of the danger, we are not told; but the facts revealed lose none of their value from incompletion of the narrative. Of the total numbers of the sheep clipped no account is given; but the fact that many hundreds died from cold in consequence is noteworthy. Besides the above evidence, spontaneously brought forth after lying nine years dormant, another set of observations have been made known to the public and the scientific world by some master butchers, whose evidence was taken in support of the recent prosecution. It was shewn by these witnesses that it was not the farmers who clipped the sheep sent to the London market in that cold weather, before the proper season, but jobbers, who bought of them and stood their own market. Their motive for clipping the sheep was the attainment of a trifle more money for the fleeces and the shorn sheep separately, than could have been realised for the sheep alone sold in their wool. But the most important statements of these witnesses were those which went to shew that the flesh of the sheep becomes deteriorated so manifestly through the clipping, that men accustomed to the difference in appearance can distinguish at once between mutton of the clipped and that of non-clipped sheep.

My own observations made on horses, and experience accumulated over a long time, coroborate all that has been brought out in regard to sheep shorn without proper regard to season and weather. Without going into the details of cases now, as I have done before in the papers referred to, and by demonstrations with the horses present, I may say that so rapidly are changes on the animal constitution effected, even before any exposure to inclement weather has taken place, that I have seen lock-jaw happen within thirty hours of the commencement of the operation, and before the men who did the job had left the stable at noon on the second day of their work; the valuable horse here alluded to, died in the space of four days from the attack, despite devisable measures taken for his relief.

Having alluded to the analogy of effects produced by clipping horses, and shearing sheep in cold weather, out of season, I beg to record some remarks on the points of difference necessary to be taken into consideration in reference to the two orders of animals; and, therefore, in concluding my remarks on sheep, may say that their case is special, and to some extent to be looked at alone, though physiologically the cases of the horse and the sheep must be regarded alike. Both are ordained for important purposes—sheep to supply us with raiment and food, but with the former most obviously, as we read throughout all recorded times. But we can only appropriate the sheep's fleece at the season of the year when it can be dispensed with, and then with advantage and comfort to the animal which furnishes it; hence, the proper season has been called the wool harvest. As in some countries the people speak of the silk harvest, the bee harvest, and so on, in reference to the gathering in of the hay, corn, the grape, olive, &c., sheep shearing is a proper thing to be done in its proper time.

Altogether different to the case of the sheep is that of the horse in these respects. The horse's hair is destined for the requirements of its own economy, is of no use to us, and cannot be removed with impunity to the animal at any season of the year. A provision is made by which the horse moults—or sheds his coat at regular intervals, twice in every year of his life—that is, changes the hair covering the body, which in the main regulates the temperature, but retains intact and permanent the hair on some localities, the mane, tail, lips, the long hairs in the region of the eye, which defend the organ and regulate its functions; and lastly, but most important, the long wavy hair which is furnished in the regions of the feet, culminating in the tuft, or fanon, which, with the structures it covers, are as essential to the health and power of the horse, as it is symmetrical in appearance. All who try to learn and follow Nature's laws, and none have any right to meddle in the management of animals who neglect these, may learn that much may be done to attain perfection, but much more certainly still, by default, to defeat order and purpose in their case. Horses surrounded by an atmosphere congenial to them, and which have had food and other requirements accordingly, appear beautiful, but when exposed to wet and cold, and are badly nourished, Nature provides them with abundance of hair to keep up the warmth of their bodies. When in this state they are pronounced to be as rough as bears, and the expression is literally correct; and since it has become the fashion for the majority of horse-owners to be also horse-sellers, and the horses therefore required to be always in a more or less deceptive state for sale, this roughness is summarily removed by the process of clipping and singeing; and instead of his own hair, which effects much for the animal economy, besides the mechanical part, such as a blanket covering furnishes, yet the horse is forthwith clipped and wrapped up in blankets, hooded and bandaged, and besides the immediate risk to life, is rendered less fit for all ordinary purposes for many months afterwards.

Now, by reversing these modes of procedure under similar circumstances, let us see how the matter stands—and it is no mere theoretical speculation that I am submitting, but old knowledge, which has never failed, when properly acted on, of producing good results. Horses may be rough, and still in sound condition—instance being kept in winter in a dry roomy yard, with proper protecting sheds, and good feeding; still exexposed to a low temperature they will have a thick woolly coat contiguous to the skin, and long hair loosely overlaying this, which keeps [illegible] and wind distant from its [illegible] are also rough horses of another condition—those exposed, like the above, to low temperature, but which are impoverished for want of good food, and exposed to wet; these have emaciated, weak bodies; and while their case is made desperate by clipping, no course of management can render them efficient for full use in a brief space of time, but in both cases the same rational course of procedure will produce the best possible results in the shortest possible time. The proper course is comprised in what is called good management, or good grooming—viz., feeding, exercise, properly regulated work, efficiently ventilated but not a cold stable; a rug for covering the body is unobjectionable, and often necessary, with efficient cleaning. Under such a course, nothing can retain the rough coat longer than the exigencies of the system require it, and in the case of the well-conditioned horse in body, even if taken up in December, ten weeks will not elapse before all the long coat will be cast off, while the general condition and working power of the horse will have improved from the first, uninterruptedly; and even in the case of the horses poor in body, all will go on in the same way, though, by starting from different points, the same goal cannot be reached until a later period.

All of us who have passed middle age of allotted life can remember the time when we abstracted blood copiously from almost all the patients we attended for disorders, real or imagined. Hunters in perfect health used then to be bled to the extent of several quarts, on the same morning; and all horses which escaped these ordeals, and they were few, were regarded as the neglected, ill-managed classes. Well, as these procedures stood a long while—probably they took a century to grow up, and only blossomed—when we were taught, as part of what was called a science, to regard these as wise measures, not only to be approved, but to be extended beyond the current usage. I confess, now, to be sanguine in the belief, that this horse-clipping inconsistency will give way rapidly, somewhat proportionate to its speedy and spurious growth, like bleeding, and the cropping horses' ears, knicking tails, short docking, &c. Though I have no faith in the effect of coercion, except as a resource, with the hope that such means may never be extensively required. Instruction, and if there are no instructors, common sense, must be appealed to.

CRACKED HEELS OF HORSES.

CART horses were formerly so universally subject to cracked heels and grease, that it became customary to refer to the animal's remarkable liability to the disease to the presence of long coarse hair about his fetlock joints, causing the retention of dirt and wet, and thus exercising an injurious influence upon the skin. Since greater care has been taken in the stable management of cart horses, the predisposition has to a great extent ceased, although the long hair remains. This comparative immunity is believed to be due to the abandonment of the former system of washing the legs when the horse returned from work; instead of doing this, the plan now commonly adopted is to allow the legs to become dry, and then to brush out the dirt by means of a stable broom or hard brush. In some large stables, where cracked heels and grease used to be always more or less prevalent, the horses, since the employment of the dry brush, have continued free from both diseases. It might perhaps be thought that when a horse returns to his stables with his legs thickly coated with mud, a good washing would materially contribute to his comfort rather than render him susceptible to disease, and in reality the fact is so; but it must be remembered that in stables where large numbers of horses are congregated, very little time can be devoted to each animal, and consequently the leg-washing generally amounts to the removal of the layer of mud, which to some extent kept the skin warm, while the parts, after being thoroughly drenched with water, are left wet, and the moisture quickly evaporating in the heated atmosphere of the stable, generates an intense degree of cold. Such a method of washing the legs is not to be compared to that which a well-cared for horse undergoes when he reaches his stables. Tepid water to cleanse the skin, ample time to thoroughly dry it, and flannel bandages to envelop the legs and prevent the effects of evaporation, are not among the appliances of the stables to which we have alluded; and the improvement which has been effected really consists in the abandonment of a method of treatment which, however advantageous it might be under certain conditions, proved to be injurious whenever it was not effectually carried out. The conclusion to be drawn from the circumstances is, that unless a horse's legs are rubbed perfectly dry after being washed, it is much safer to leave them untouched, particularly if the skin is well protected by a quantity of coarse hair, as the legs of a cart horse always are. The same system of dry brushing has, however, been equally successful with omnibus and cab horses, providing that the long hair has little to do with the matter either way. Cracked heels of the ordinary kind are not attended with inflammatory symptoms, and at first do not produce lameness; if the disease is neglected, particles of dirt may be introduced into the wounds, and occasion irritation and lameness. So little inconvenience, however, attends the commencement of the affection, that it is often not noticed until the horse becomes lame. When examined, the heels are found to be cracked transversely in several places, the edges of the wounds will perhaps be hard, and probably there will be a little discharge. The skin, however, is never puffy, as in the acute disease, but rather hard, scaly, and inelastic; and in place of the heat of inflammation there is the coldness indicative of congestion. The disease, in fact, is as nearly as possible the opposite of that described as acute cracked heels, and requires a very different kind of treatment. Various remedies are in vogue, but they are all of an astringent or styptic nature. Camphor, white lead, sulphate of zinc, acetate of copper, chloride of zinc, acetate of lead, are used in the form of liniment, ointment, or lotion, and generally with success. A satisfactory result will be more quic attained if the horse is kept from places where he will be exposed to the ordinary causes of the disease; but even when the animal's daily work necessitates such exposure, a cure is not hopeless, although it will be retarded. A very excellent heel ointment, applicable to simple non-inflammatory cracked heels, is composed of carbonate of lead (white lead) and powdered camphor, of each equal parts, added to eight parts of melted lard, and stirred until nearly cold. This perfectly white ointment may be coloured to suit the colour of the horse's legs, by adding various proportions of lamp-black and Armenian bole. When the wounds have healed, it is desirable to keep the skin moist by daily applications of glycerine; this will also have the effect of removing the accumulation of hard cuticle and permitting the free action of the glandular structures, which are very numerous in this part. Neglect of cleanliness is one reason why cracks in the skin of the heels are more frequent than cracks in the flexures of joints in other parts of the body; while other portions of the integument receive a liberal share of curry-comb and brush, the bends of the heels are often left untouched, and consequently the loosened desquamating scales of cuticle and the dry masses of sebaceous secretion accumulate, and seriously obstruct the due performance of the excretive functions. Under these circumstances, the skin of the heels becomes hard and inelastic—literally, in fact, brittle—and incapable of yielding to the stretching force which is applied during progression without cracking.—*Field.*

The Dairy and Poultry-Yard.

THE HENWIFE'S KALENDAR FOR JUNE.

EARLY hatched chickens will now be ready for market. Previous to being sent off, they can be put into coops and fattened by means of one or other of the plans before detailed, the best having previously been selected for keeping up the breed. Feed all kinds of poultry on a variety of food; the more it can be varied the better. As the housekeeper who puts on her table, day after day, the same viands, be they ever so good, will soon find the appetites of her household to flag, so will the henwife find her poultry droop if she present to them the same unvarying mess. Variety must therefore be studied. Oats, barley, wheat, rice, may all be given in turn. Buckwheat is much used in France for fattening fowls. Sunflower seeds are also freely eaten by poultry. and are said to fatten quickly. Grain can be given dry and boiled alternately, except oats, which must always be in their raw, dry state. Barley, if used freely raw, will be sure to injure the fowls by swelling out in their crops; it is, therefore, always the safest plan to have it previously boiled, when it will be found an economical food. Wheat is also rendered more economical by boiling, and is a favourite with fowls. Rice must be boiled very soft, and allowed to cool in the water, when it will be found to swell out to a great extent. Indian meal is also a very nourishing food. Peas and beans have been much recommended, but we have never found either the one or other a favourite with poultry. Should there be any dairy refuse in the shape of skim, sour, or curdled milk, it will be found suitable for poultry of all ages, especially for the *young* of all kinds of domesticated fowls. Parsley, cabbage leaves, lettuce leaves, &c., may be cut into small bits and given to chickens mixed with their food; they will be found to pick out the green food and to eat it greedily. The turkey poults have by this time emerged from their shelly prison, and will now require care—an extra amount indeed, as they are so delicate and difficult to rear. They are commonly fed for the first week on hard boiled egg, chopped, and mixed with bread crumbs, and a little pepper, with milk or water to drink. After the first week, they get, in addition, minced onions, boiled peas, curds, oatmeal moistened in water, and then grain like the larger fowls. We have seen large and beautiful flocks raised by merely giving the oatmeal, *unboiled*, moistened with water, chopped lettuce or cresses, or nettles mixed with it, along with a little pepper. Abundance of clean water provided, but in addition, a daily allowance of new milk also allowed. A little egg, or liver, or curd occasionally; but the milk must be continued for two or three months. They must be carefully protected from wind and rain, and sheltered from the scorching rays of the sun.

The turkey hen is a most devoted mother; she will hatch the eggs of the hen, and bestow the same attention on the chickens as she would on her own poults. As may be imagined, she is equally vicious to strange broods. Woe be to the poor little thing which attempts to join her favoured family; we have even seen her actually kill her *very* own poult (hatched by a hen) when we attempted to add it to her brood, so thoroughly fierce is she when entrusted with the care of the young, whether her own or those of the hen. At other times she is gentle, and her elegant appearance makes her a great ornament to a poultry-yard.

It must here be stated, that when the chickens are about three months old they must be separated.

The Naturalist.

NOTES ON RANGE IN DEPTH OF MARINE ALGÆ.

BY PROFESSOR DICKIE.

HE bathymetrical range of animal life has been of late attracting a due share of attention, and of great interest have been ascertained. Very has been done regarding the range in depth of e plants ; few instances have been recorded, and some of these are not quite trustworthy.

hen the dredge ceases to scrape the bottom, it nes in its progress to the surface much the same owing net, capturing bodies which are being car- along by currents, and therefore great caution is sary in reference to any marine plants found in it. veeds are among the most common of all bodies d by currents near the surface or at various s below, and from their nature are very likely to tangled and brought up.

e present communication is offered chiefly with iew of directing attention to the subject, and of ding a few facts, which may, perhaps, stimulate gists to add to the number of such.

ere are two effects which diminished supply of at great depths may be expected to produce algæ—decrease of size and modification of r. The proportion of light necessary for the ger- ion of the spores, and subsequent development, deserves the attention of physiologists.[*]

e influence of the law, that in water there is a of obliquity beyond which transmission into the nnot occur, giving rise to total reflection, and the al absorption exerted on the different separable f light can only be hinted at here in relation to bject.

rther, it is very notable that in high northern des, where thick ice covers the surface of the sea great part of the year, and where, moreover, bsence of direct sunlight for several months er produces very peculiar conditions, neverthe- a-weeds abound, the number of species not much than fifty, but some of large size, and most of individually plentiful.[†]

e late Professor E. Forbes adopted the follow- ones in relation to the distribution of marine isms on the British shores :—1st, Littoral zone, comprehending the space between tide marks ; 2d, The Laminarian, from low-water mark to 15 or 20 fathoms ; 3d, The median zone,[‡] from 15 or 20 fathoms to 50 ; 4th, The Infra-median ; and 5th, The Abyssal. In the first two of these sea-weeds are abundant, they are rare in the lower part of the median zone, and very rare indeed beyond it.

In recording habitats of British algæ (as in "Phycologia" of the late Professor Harvey), the expression "cast up from deep water" is often used ; it is somewhat indefinite, nevertheless, as many delicate species are thrown on shore in very perfect condition, they cannot have come from any great distance ; and if we examine the tidal chart in "Johnston's Physical Atlas," where depths round the British and Irish shores are also given, it will be seen that the line of 10 fathoms on the general coast is very narrow, but is wider in bays and arms of the sea ; and as these localities yield many species, 10 fathoms may be considered a common bathymetrical range. The following may be mentioned as reaching to or beyond 15 fathoms :—Chorda Filum, Cutleria multifida, Zonaria parvula, Polysiphonia parasitica, Chylocladia kaliformis, Melobesia calcarea, Rhodymenia cristata, Phyllophora rubens, Phyllophora Brodiæi, Peyssonelia Dubyi, and species of Delesseria. Several of these are also found in the littoral zone.

It is of interest, however, to ascertain the absolute limit of vegetable life on our own shores, and the only case which has come under my own notice is the following :—About ten years ago, in company with the late Mr Hyndman of Belfast, and Mr Waller, when dredging near the Maiden Rocks, coast of Antrim, our dredge got fast on rocky bottom at a depth of about 80 fathoms. With some difficulty we recovered it. On examination it contained a fine mollusca, abundance of living zoophytes,[*] and two red algæ, the largest being Phyllophora Brodiæi, quite fresh, and of the usual colour. It appeared to have been recently torn from its site ; still, as it is not unfrequently cast upon the Antrim coast, it is just possible that the specimen may have been loose and accidentally entangled in the dredge. Regarding the

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n Annals of Natural History, Dec. 1868, there are remarks by Mr Jeffreys regarding various Mollusca, bright-coloured shells and well-developed eyes, at s from 200 to more than 1500 fathoms.

urnal of Linnean Society, volume ix.

[‡] He used the term median or coralline zone, the latter very loose or incorrect if applied to the corallinidæ of algologists.

other species, I have no doubt it was attached near the base of one of the living zoophytes, and although not more than a quarter of an inch in length, without doubt it could be referred to Delesseria sinuosa, a species very widely distributed along the British and Irish shores.

In vol. ii., p. 464, of the "Antarctic Flora," Dr J. D. Hooker states that "8 to 10 fathoms are the utmost depth at which, judging by our experience, submerged sea-weed vegetates in the South Temperate and Antarctic Ocean." This may be the general limit, but Macrocystis pyrifera is reported in the same work, as attached to the bottom in 40 fathoms, though most of the very long stem—700 feet—lies near the surface. Lamouroux speaks of the algæ growing at 100 or 200 fathoms, but the statement is more than doubtful. Humboldt records Fucus vitifolius (Caulerpa vitifolia, Lamx. ; Chauvinia vitifolia, Kuzing), as growing in 30 fathoms, and quite green. In "Nereis Americana," Anadyomene stellata is stated to grow in 20 fathoms, and of the usual green colour, in the Gulf of Mexico. In his report on the Ægean Sea, the late Professor E. Forbes states that Constantinea reniformis, P. and R., occurs at 50 fathoms, and he considered this as the greatest depth, accurately observed, at which algæ vegetate. In a recent number of Silliman's Journal, Count Pourtales states that Centroceras clavulatum came up in a dredge which had been at the bottom in 270 fathoms; this species is stated in "Nereis Americana" as abundant at Key West, everywhere near low-water mark. I doubt very much whether this plant was brought from the bottom; most likely it was caught by the dredge in its progress towards the surface.

In the supplement to Capt. Inglefield's "Summer Search for Sir John Franklin," 1853, there are some cases which were recorded by myself in the Botanical Supplement to the work. They were given on the authority of Dr P. Sutherland, from whom I received the specimens—viz. :—

	fathoms.
Fucus vesiculosus - - -	40 to 50
Desmarestia aculeata - -	80 ,, 100
Dictyosiphon fœniculaceus -	50 ,, 100
Agarum Turneri - - -	10 ,, 100
Laminaria longicruris - -	50 ,, 100
Chordaria flagelliformis - -	80 ,, 100
Chætopteris plumosa - -	25 ,, 30
Ectocarpus Landsburgii (?) -	70 ,, 80
Euthora cristata - - -	98 ,, 100
Ptilota serrata - - -	30 ,, 40
Kalymenia Pennyi - -	20 ,, —
Conferva Melagonium - -	20 ,, —

Respecting the greater depths in the above list, I have much doubt. It is a well-established fact that masses of algæ are set adrift by the action of the ice in summer, and are seen floating in great masses. Under such circumstances, though the dredge may have been at the bottom in 100 fathoms, it is rash to conclude that all its contents, especially algae, have been growing at that depth.

During the voyage of the "Fox," under command of Sir L. M'Clintock, Dr Walker dredged Rhodymeria interrupta at the east end of Bellot Strait, in about 60 fathoms as estimated; the plant is now known to be an Arctic form of Phyllophora Brodiæi, and this is of some interest in relation to the probable existence of the plant at 80 fathoms on the Irish coast, already alluded to. Captain Thomas Mitchell, late commander of the "Queen of Nations," belonging to Aberdeen, gave me some material which came up adhering to the sounding lead, from the Abrolhos shoal, in lat. 18 deg. 11 sec. S. ; long. 37 deg. 43 min. 15 sec. W., 30 miles from the nearest part of the coast of Brazil. Most of it consisted of a species of Melobesia, much decayed, but partly also fresh and entire, adhering to it; growing on it, in fact, there is a solitary specimen of an alga of bright crimson. On examination, I had no hesitation in referring it to the genus Peyssonelia. It is not very prudent to describe supposed new species from solitary examples; nevertheless, as it seems to differ from others known to me, and being of interest in relation to the subject, it may be legitimate to record it under the provisional name Peyssonelia abyssicola, sp. n.* If a single cast of the sounding-lead did such good service, how much more would the dredge accomplish on this Abrolhos shoal?

Finally, it is worthy of notice, that species which reach the lowest depth where algæ vegetate are all Rhodosperius; next in order the olive-coloured. The Chlorosperms prevail chiefly in the littoral and upper part of the laminarian zones.

Diatomacæ are usually considered to rank among the lower forms of algæ. I may close with a brief reference to their range. Although some few species have been certainly brought up from the greatest depths reached by the dredge, it does not necessarily follow that they live and propagate there. Many of the marine species adhere to the higher forms of seaweeds, and necessarily have a limited range; while not a few of the free species occur at or not far below the surface. Along with the Delesseria already mentioned as growing at 80 fathoms, I only detected three diatoms—viz., Melosira marina, Coscinodiscus radiatus, and C. eccentricus. These minute organisms are so indestructible, so abundant, and widely diffused, that it is not surprising to find them in matter dredged at various depths. The Melobesia from the Abrolhos shoal yielded at least a dozen species; but I cannot positively assert that they were living.

It is to be hoped that in future more attention will be paid to this subject. Exact records of depth will add to the interest pertaining to the algæ procured, besides contributing to a department of inquiry very much overlooked: in this respect zoologists are far a-head of algologists.

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* It may be interesting to state the species: Sertularia abietina, S. rugosa, S. argentea, S. rosacea, Tubularia indivisa, T. Larynx, Tubulipora serpens, Halecium Beanii, Flustra avicularis, Crisia eburnea, Laomedea —— (?), and Caryophyllia Smithii. The latter lived in an aquarium for nearly two years after.

The Country Gentlewoman.

BOUQUETS.

BOUQUETS are decidedly in the ascendant this season; the bouquets at the Crystal Palace on the 19th were certainly *the* feature of the *show*. "Have you seen the bouquets?" "What do you think of the boquets?" caught one's ear on every side; but, though to look at the bouquets was evidently the correct thing, I cannot say that having looked, I felt any very remarkable amount of admiration. I liked a collection of wild flowers, skilfully arranged, best of any. The bridal bouquets were, in my humble opinion, very heavy—almost as, I was going to write it, ugly as the foreign arrangements, which were all stuck in clay, and really exhibited exceeding lack of taste. By-the-way, I saw at a friend's house a few days since an exceedingly pretty china bouquet-holder, just the sort of thing to make a wedding present of. It would look so well on the breakfast table, to hold the bride's bouquet on her return from church. I believe they are sold at the Baker Street Bazaar. One hears so much of foreign taste in the arrangement of colour, that an "International Show" of bouquets excited no little amount of curiosity amongst the fair sex. They crowded and pushed each other about in a marvellous way, and I could but wish that there had been something a little better worth seeing—something to learn, in fact, after one had got within sight. But no; our foreign relatives were shy, I suppose, for the only individual who ventured to shew his skill was a man of Ghent. I was sadly disappointed, as I hoped to see a few Parisian bouquets side by side with our English-made ones. Even our street bouquet-makers are now getting into the way of tying up little blossoms on pieces of twig, and then enveloping the nosegay in a mantle of moss. I bought such a pretty-looking one last week; the poor girl who sold it to me had a very good idea of arrangement, but, alas! when I looked at my flowers the next day they were all withered. Some faded blossoms I prize, but there were no memories belonging to these, to pour, as Camoens says, upon the heart pleasure, though clinging round the sepulchre of joy. I simply felt cross, and I wondered how my bouquet, having been carefully placed in water, could have died. I took off the moss, and there remained a few dried birch stems with flowers on the extreme point of each. The water, though up to the very rim of the vase, had never been within an inch or two of the flowers at all. The bouquet was made to sell, not to last; and a pretty sell it is in London, to find a nosegay you purchase over night, and want to look nice for your breakfast table in the morning, drooping like the last rose of summer's lovely companion. Commend me to the old-fashioned bouquet I have just bought to-day, stems and all: no deception here. I can soon re-arrange it, and mix a few fern leaves with it.

I cannot close this note without a few words in praise of the foliage plants. I saw some old friends from Hants amongst them. The Leigh Park collection took the second prize; and the orchids, for which Mr Young, Mr Stone's gardener, took a first prize, were very lovely. What magnificent new orchids some of the collectors are bringing out this year. I shall inflict an account of a few of them on your readers, if you kindly find space for this note.—*Firefly.*

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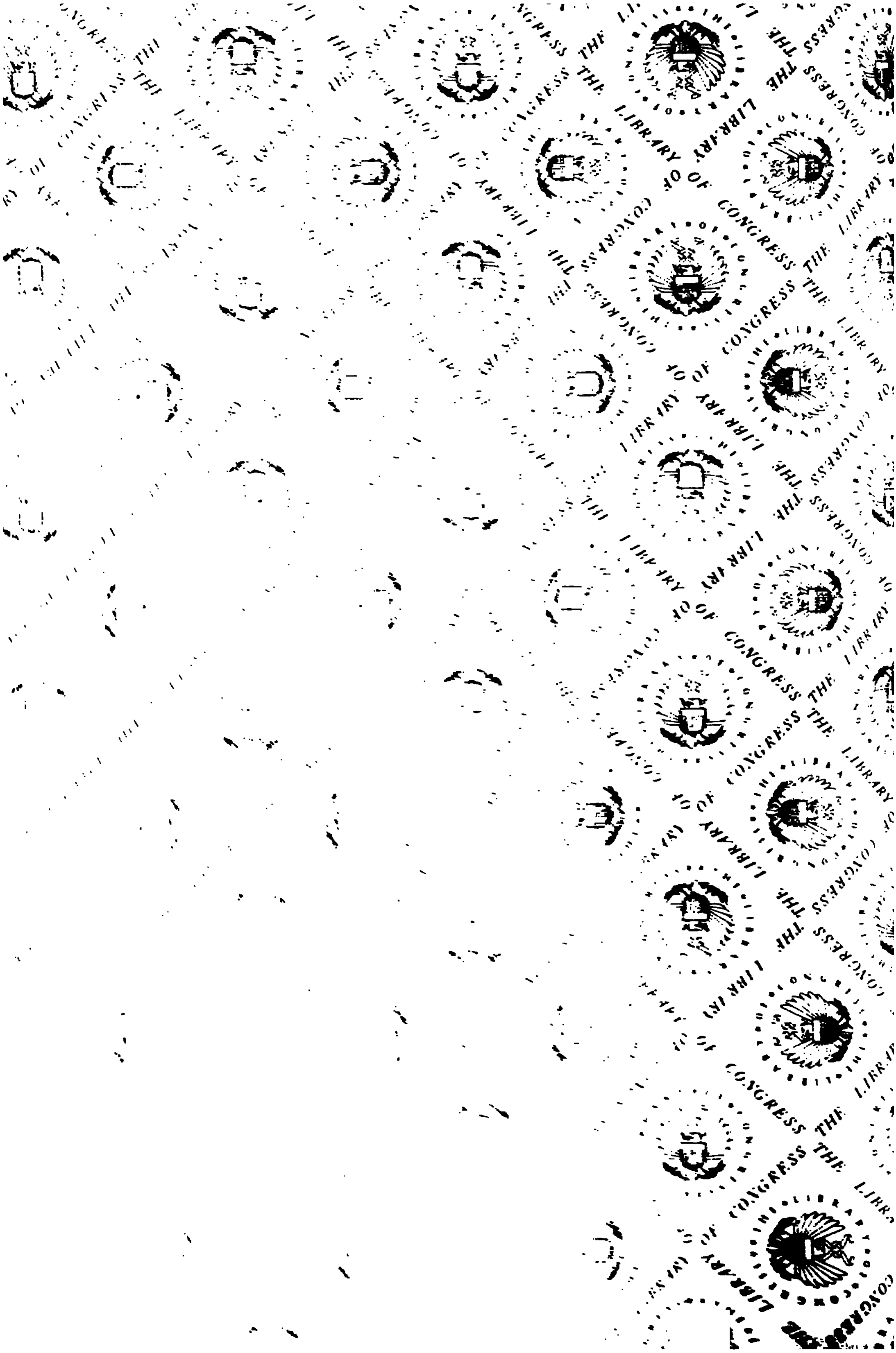
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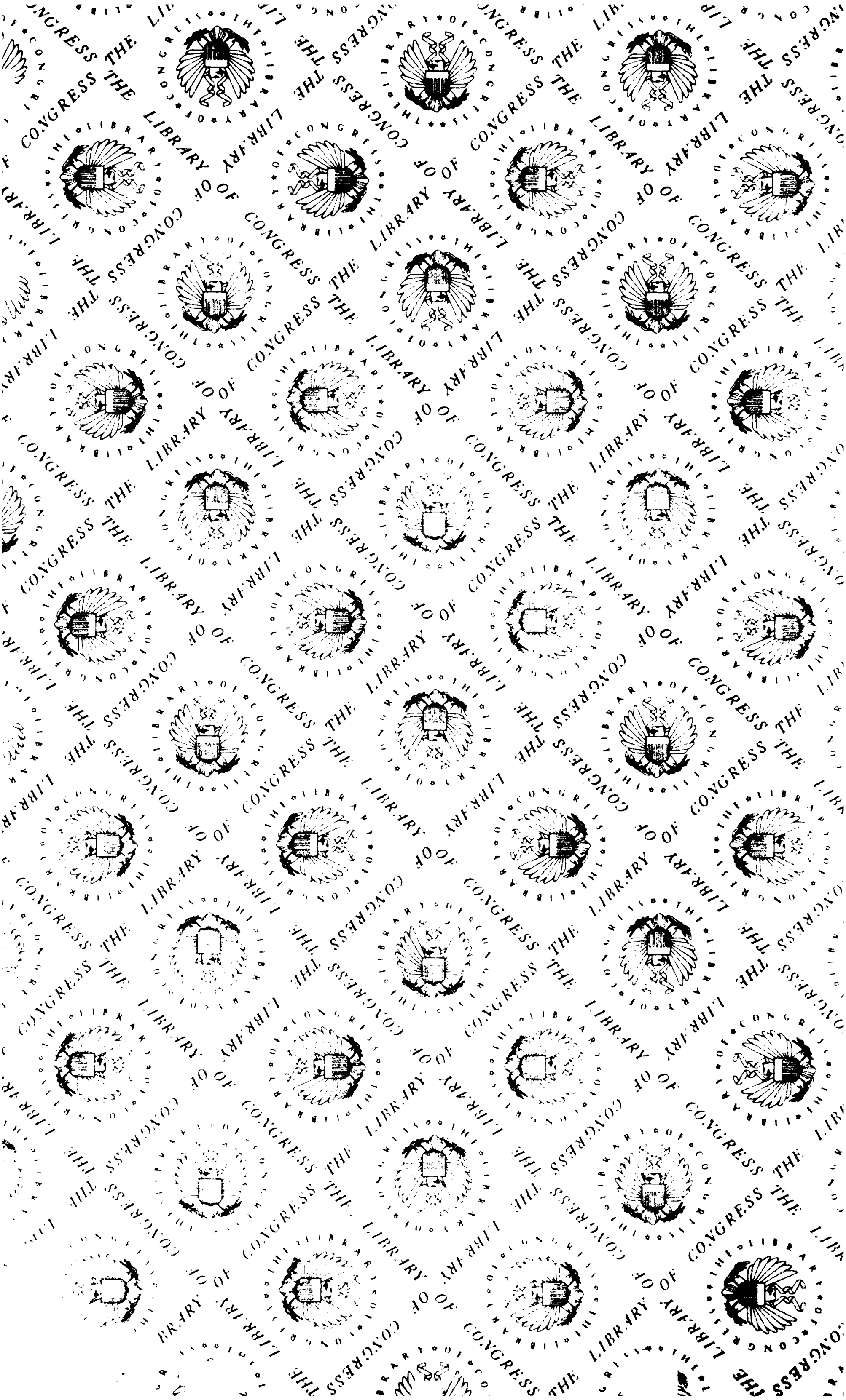
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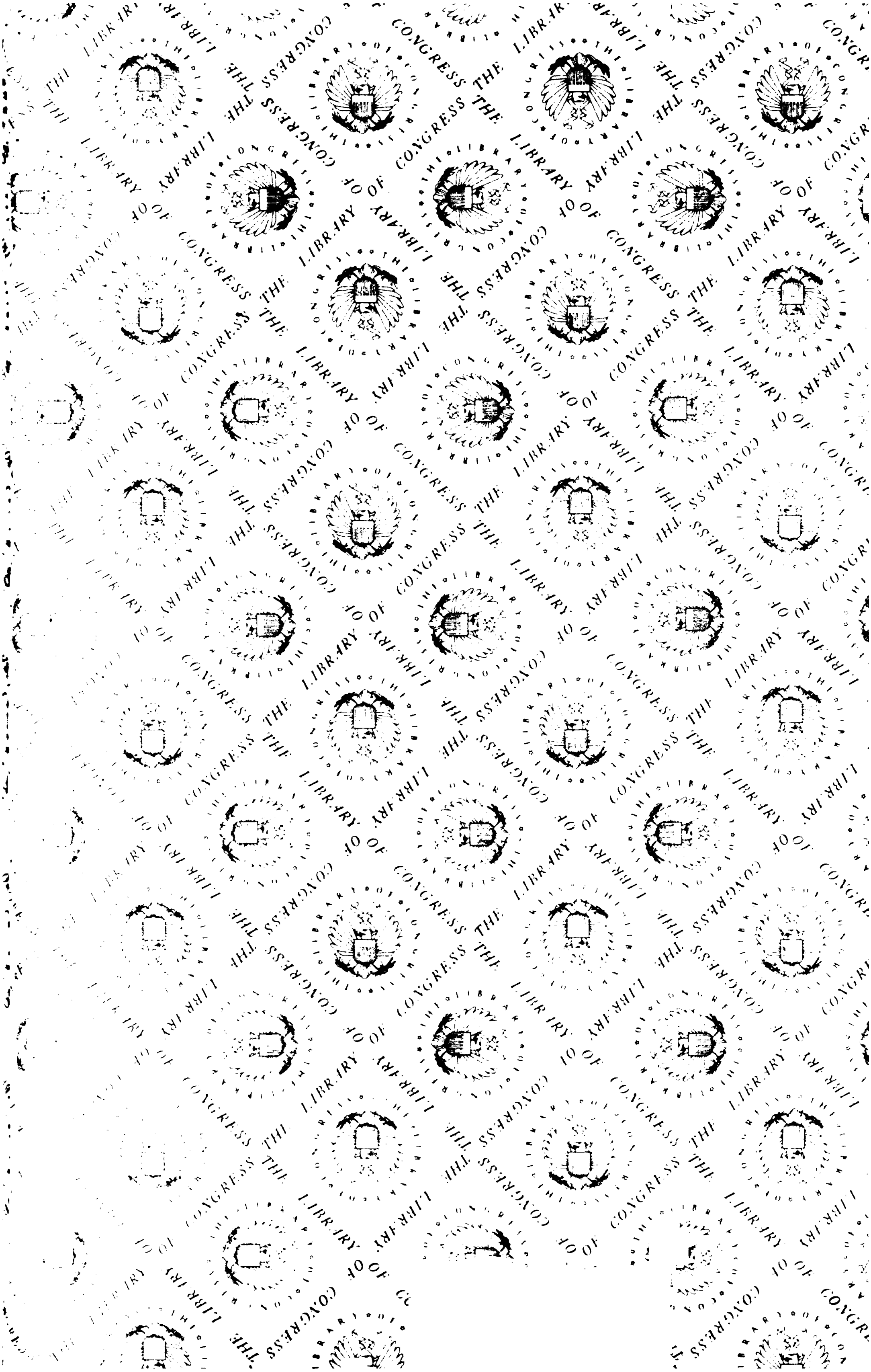
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